MICHIGAN STATE NORMAL COLLEGE
TRAINING SCHOOL DEPARTMENT.

VOLUME III APRIL, 1912 NUMBER 4

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

PROBLEMS AND METHODS OF INVESTIGATION IN HANDWRITING.

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In an experimental investigation of the handwriting of school children, it was found that the speed and the quality of the writing do not always vary together. That is, if one compares the lower and the upper grades with each other, the writing in one of the upper grades is in some cases more rapid than the writing of a lower grade, but of poorer quality. Or, on the other hand, the quality may be better in the higher grade, but the speed less. In order to interpret this fact it is of course necessary to know the method which was used in the two cases, and, in particular, the relative emphasis which was laid on the characteristics of speed and of form, but this illustration will serve to raise one of the most important problems in connection with the teaching of writing, namely, the problem of the relation between speed and quality in writing.

We may investigate the relation between speed and quality in a preliminary way by comparing the different individuals of a class in regard to these two characteristics. This will show whether or not a fast writer is also likely to be a good writer, or vice versa, or whether there is no constant relation between the two characteristics. In order to determine the answer to this question in a rough way, we may grade the children of a class on the basis of the speed and the quality of their writing, separately. We may then pick out the ten fastest writers of the class and place them in one group, and

place the ten slowest writers in another group. We may then compare these two groups—the fast writers and the slow writers—on the basis of the quality of their writing. That is, we may average the quality of the writing of each group and determine whether there is a marked difference between the two; or we may pick out the ten best writers and the ten poorest writers from the point of view of quality, and see to what extent, if at all, they correspond to the ten fastest and the ten slowest. This is merely a rough method of determining whether or not there is a relationship between the two characteristics.

We may now carry the investigation a step farther by asking the more significant question as to the effect upon quality of an emphasis upon the speed of writing, or of the effect upon speed of an emphasis upon quality. Suppose, for example, we have the same children write some similiar material in three ways. We will first instruct them to write the material without any special emphasis upon either speed or form. The next time we instruct them to write rapidly and note the effect which this instruction has upon the speed of the writing. If there is a marked increase in speed, we may determine how far this affects the quality, either favorably or unfavorably. In the third place, we may instruct the children to write as well as they can, and again see what effect our instruction has upon the quality of their writing and how this is related to speed. The main question is this: when the child writes rapidly, does he do so at the sacrifice of form; or, to put the question in another way, how far can he increase his ordinary speed of writing without sacrificing form? In order that the results may not be confused by irrelevant factors, we must be careful to have the other conditions in the different parts of the experiment constant. The means of securing such uniformity will be discussed in the later part of the article.

If now we should find that the increase in speed beyond a certain point causes a decrease in the quality of the writing, we have still the further question whether or not a course of training in which the speed is emphasized may be given, which will result in an increase in speed without a sacrifice of form.

Or, on the other hand, we may inquire what the effect of an extended course of training upon particular features of form will have upon these elements of form, and upon the speed of writing. For the study of this problem the writing lesson should be so conducted as to emphasize clearly one or the other of the two characteristics, and then the results should be measured in terms of both speed and form. Suppose, for example, the writing instruction for several months in a given grade were directed toward improvement in speed, for the main part. Attention should be given in this form of training to the use of rhythm in maintaining an increasing speed. If, at the end of the period of training, we have succeeded in materially increasing the speed of writing, we may then determine whether or not there has been any equivalent change in quality.

In directing attention to the quality of writing, through a similiar course of training, it is well to lay particular emphasis upon certain features of form in order to determine to what extent there is a modification of these particular elements. That is, it will be useful not merely to direct attention to form in general, but to concentrate attention upon certain elements of form—such, for example, as the uniformity of slant or the uniformity of the alignment of the top and bottom of the letters. Or, we may select certain letters and attempt to bring about improvement in them. In this way a comparison may be made between the amount of improvement which is brought about in the different letters, in order to determine whether some are more difficult to form than others. After the training upon certain letters it would be well to secure an answer to two questions. First, how far have these particular letters been improved, and second, has there been any transfer of improvement to other letters? For this the teacher is left to make her own analysis of the letters and to fix her own standard of comparison. She should keep the writing of the children before and after the courses of training in order to compare the samples written by the same child at the two times. In this way she will be able to determine not merely whether an improvement does or does not take place on the average, but may also determine

in what respect the writing of the individual child changes under a given sort of treatment. From this detailed examination and analysis of the writing of the individual children, some general conclusions may then be drawn by averaging the results of the individual children. When it has been determined how much progress has been made in quality, this may be compared with the change in speed which has taken place during the same period. Thus the effect upon speed of a definite kind and amount of improvement in quality may be measured.

These are some of the problems which may be investigated by the grade teacher in her ordinary conduct of writing instruction. There are some broader problems which require a somewhat more extended control of writing instruction, and which are therefore appropriate for supervisors, principals, or superintendents, or for such investigators as may have access to large groups of children. A very general problem which has an important bearing upon the pedagogy of writing concerns the way in which writing develops at different ages. We may take again our two characteristics, speed and form, and determine how they change from grade to grade, or from one age to another. We may examine both speed and form separately and then work out their relation to one another. Take speed, for example. Is it true, as is assumed by certain systems of teaching penmanship, that the child in the first grade is capable of practically the same speed as the child in the eighth grade? Are there certain times when there is a marked increase in the capacity for rapid writing, and if so, when do these transitional times come? Our general knowledge of the child's development indicates that we should find a marked development of the co-ordination at about the ninth or tenth year. If this is the case, can we find traces of it in the writing of the child at this time?

The same question may be put in relation to form. We may investigate here not merely the improvement in form in the early years, but also the check in improvement or the actual disintegration which is apt to appear in the upper grades or in the high school. Is this due merely to the fact

MICHIGAN STATE NORMAL COLLEGE
TRAINING SCHOOL DEPARTMENT.

that writing drill is relaxed, or is there some deeper reason? Is there at these later years a marked increase in speed which might perhaps account for the check in development of form?

In order to determine the answer to these questions we should grade the writing of children at the various ages in speed and quality, and determine the average and the amount of variation for the different ages. It is important to include the degree of variation within the different groups as well as merely the average.

This question of the development of form and speed is, of course, complicated by the results of different forms of training. It is possible that one form of training might produce a higher degree of speed in the early years than another form, and this greater speed might or might not be accompanied by a sacrifice of form. A specific question which arises here is, what is the consequence of teaching rapid writing movement in the first two or three grades, or of allowing the child during these early years to use a slower drawing movement, while his attention is concentrated upon form. There are two distinct positions taken in regard to this question. Some writing systems give the same sort of movement and speed drill in the very earliest years, which are given in the later years, while others attempt to adapt the form of teaching to the development of the child in motor capacity. It would seem to be more in accord with our knowledge of the child's development to allow him to attack the problem of form in the first two or three years, and to defer the development of a rapid and smoothly co-ordination movement until the intermediate grades, but this question can not be decided merely by inference from our general knowledge. It should be investigated and decided by comparing the results of the two forms of procedure. This might perhaps be done by merely selecting two school systems in which the contrasted forms of training are given. We would then examine the writing of the fifth or sixth grade children, who had begun their rapid movement drill in the first grade, with those who had not been given such drill until the third or fourth grade. We would be still somewhat uncertain, however, because of the fact that there might be other differences of method which

would account for the difference in result. It would therefore be more conclusive to direct the training of two similar schools in such a way that the only difference in the method would be this one in the time of beginning rapid movement drill. Such investigation would of course require several years for its prosecution, but it would have the advantage of definitely settling a mooted question.

Other differences in method might also be investigated. For this purpose, according to the fundamental principle of experimentation, we should keep all other conditions, except the one which we are studying, as nearly alike as possible among the different groups under investigation. For example, if we were taking up the question of the relative advantages of the arm movement and of the combined arm and finger movement, we should see to it that two groups of children are taught exactly alike, except that one was given the exclusive arm movement and the other the combined movement. It is generally conceded that the introduction of the arm movement marked a great advance in the teaching of penmanship, but it is a question whether the advocates of this system have not perhaps gone to an extreme in attempting to exclude all finger movement. This question might be pretty well determined in the course of a year's training of two groups of children of the same age. In order to be able to say how far the two groups of children actually use finger movement both at the beginning and at the end of the experiment, it would be well to secure specimens of their writing with hand tracer constructed by Professor Judd.[1]

A still more radical difference in method could be investigated by the comparison of the results of a year's teaching with one group of children in which the movement drill aspect of writing was emphasized, with the results of a similiar period of training of another group in which the analysis of the form of the writing was the chief feature of the method. It would be well to note what the effect of these two contrasted methods is upon both the form and the speed of the writing.

In a similar manner any question in method which is of any

[1]This instrument is described on page 120 of Judd, Genetic Psychology for Teachers, and may be obtained at cost by addressing the writer at the University of Chicago.

movement in the pedagogy of writing may be investigated. For example, the effect of posture at the desk, or of the form of the desk itself may be studied. Why should we write upon a level desk? Would it not be a much more natural position, and one which would in large measure overcome the tendency to stoop, to tilt the desk toward the writer at an angle of 30 or 45 degrees? A trial will convince the reader that this is of immense advantage from the point of view of seeing the writing. Another question concerns the most advantageous amount and distribution of time of the writing lessons in the various grades. For example, is fifteen minutes given to writing every day better or worse than thirty minutes every other day? The question must be settled separately for the lower and the upper grades. Finally what is the best method of teaching writing in the upper grades after the writing habit has been fairly well estblished? Would it perhaps not be better to grade the general written work partly on the basis of penmanship and thus encourage careful writing in all the work rather than to have specific writing instruction? Still other questions which merit investigation will doubtless occur to the experienced teacher.

In this outline of some of the problems to be investigated, we have assumed that we have command of a method of determning the speed and the quality or form of writing. In order to insure uniformity in the grading of these two characteristics, it is necessary to point out the details of method by which such grading should be made. The measurement of speed is the simpler of the two. This may be made in two ways: first, by finding how long it takes the child to write a certain amount, and second, by finding how much is written in a certain time. The second is the more feasible method when a group of children are to be investigated at the same time. The following form of procedure is recommended. First, in regard to the matter which is to be written. Since our aim is to measure merely the speed of writing and not the speed of the thought process, the writing should not be interrupted by the necessity for reflection. That is, the child should memorize thoroughly what he is to write so that he may write continuously. Again, when a test given at one

time is to be compared with a test given at another time, the material should be as similar as possible in the two tests, though not identical. For this purpose it would be well to select a poem of uniform character and require the child to memorize it at the beginning of the experiment. One stanza should then be used at the first test and the second stanza at the second test, etc. If the child finishes the stanza within the specified period he should begin it again and so continue until the end of the period. At the end of the experiment it would be well to have the child write all of the stanzas at one time in order to find out whether they are of equal difficulty or not.

A five minute period will be found of convenient length for a test. The children should have their paper and pens ready to write at the signal from the teacher. They should then write continuously until the signal to stop is given. Either after or before the test each child should write his name, age and grade upon the paper.

The manner of giving instruction for the test is important. It has been found, for example, that the result will vary greatly according as the child thinks that the speed of his writing or the quality is being tested. If, now, we are endeavoring to secure his ordinary average writing we must be careful to avoid giving the impression that we are testing particularly either speed or form. For this purpose some such instruction as the following might be used. Without telling the child at all that he is undergoing a test, one may say: "I want you to write the first stanza of the poem which you have learned. Write is just as you would in a composition or an ordinary school exercise. If you finish before the end of the time begin and write it over again. Begin to write when I say 'Now' and stop when I say 'Stop'." It would be well to carry on a preliminary experiment in order to be sure that the children understand the instructions.

The measurement of the quality or the form of writing is more difficult. In the first place there is no universal agreement as to what is meant by good or bad writing. One may refer to legibility, or beauty, or character, or the approximation to a particular standard which is held to represent per-

fection of form. One might also analyze form into such characteristics as regularity of slope, regularity of alignment or spacing, or one might distinguish between different sorts or degrees of deviation from a standard form of letters according as the deviations were or were not predjudicial to the legibility of the writing. It would clearly be more illuminating if we should grade writing on the basis of these definite characteristics rather than upon the basis of the indefinite characteristic of quality. Some method of grading writing based upon the analysis of its quality into its elements must ultimately be worked out. For the purpose of the investigations which are here described, however, we may use the method of grading legibility which has been developed by the Division of Education of the Russell Sage Foundation under the direction of Leonard P. Ayres.[2] This method has the advantages of having been worked out in a purely objective way, and of being entirely unambiguous as to the meaning of the scale which has been produced. Differences in the scale represent differences in the ease with which the respective samples may be read. The legibility of any specimen of handwriting is to be determined, then, by deciding what sample in the scale can be read with equal ease. This procedure does not get rid of all the difficulties incident to such a judgment, but it at least furnishes an unambiguous criterion. To render the comparison easier, the scale is composed of three parallel sets of samples, made up of three styles of writing, distinguished according to the slant. Thus any sample may be compared with the

[2]Descriptions and copies of the scale may be obtained by addressing Dr. Leonard P. Ayres, Russell Sage Foundation, 400 Metropolitan Tower, New York, at the price of 5 cents each. The first effort to construct a scale for measuring handwriting was made by E. L. Thorndike. See Teachers' College Record for March, 1910. The difficulty with this scale for practical use is the ambiguity as to what constitutes excellence. The judges upon whose verdicts the construction of the scale was based were asked to consider the three qualities legibility, beauty and character. Obviously different judges may put different degrees of emphasis on these three qualities, and as a result rate a particular sample differently. A second method has been reported by D. Starch at the meeting of the American Psychological Association in December, 1911. This method consists in measuring the variability in slant and alignment of ten letters chosen from each sample. This method is more cumbersome than that of Ayres, and does not analyze the writing sufficiently to give it a distinct advantage on that score. The writer has, as a result of these considerations, chosen the Ayres method as the one to recommend for use in a practical survey of the quality of writing.

style in the scale which most nearly resembles it. This scale has the further practical advantage that it is gotten out by a central agency of educational research. It can, as a result, come easily into general use as a means for conducting surveys of handwriting, and thus serve to bring together a great deal of comparable material.

It should be said, however, that this method of grading, if used alone, is exceeding deficient. In order to obtain anything which approaches a useful measure of writing, the speed must be taken into account as well as the legibility. It will still be necessary, before we have solved all the problems which are involved in the teaching of handwriting, to carry on investigations which shall consist in an analysis of the form of the writing and of the movement and mental process by which it is produced, but for the purpose of survey and of statistical investigation this method of appraising the result rather than of analyzing the process is convenient.

The purpose of this article has been to lay out a typical set of problems and to indicate how the teacher or the supervisor of penmanship may contribute to the solution of these questions by collecting results which can be stated in a quantitative way, and which can be compared with results found by other investigators. It is by such investigation that questions regarding the relative merit of different methods of teaching may be placed upon a solid basis of fact, instead of upon theoretical inference.

NEEDED RESEARCH IN METHOD.[1]

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The field of method, like that of the *principles of education* and of *educational psychology,* is not clearly defined. What should be the basis of method is still an open question. Is it to be found in a unique psychology of the learning process or is it to be determined by the logic of subject-matter? Or, again, as Doctor Snedden suggested some three years ago, is it to be sought in a compromise between the two? (*Educational Review,* Vol. 35, pp. 237-238). These questions are subtle, may be too subtle to be answered; and yet method cannot win a distinct and worthy place in educational thought unless they are solved. A brief critical survey of the literature of the subject may offer some suggestions.

Books on method may be roughly divided into four classes. The first, and by far the largest class, consists of those works which, either in fact or in name, deal with *general method.* These treatises often discuss the broader problems of education, such as the aim and organization of schools; but the great body of them emphasize the psychology of the learning process. To all intents and purposes, they are psychologies, or at least partial ones, with illustrations from educational procedure. The second class is made up of those works which give a brief summary of the principles underlying the teaching process and then apply them to all or most of the studies in a given curriculum. The third class is constituted of works on *special method,* which usually go by such titles as Special Method in History, The Teaching of English, The Teaching of Mathematics, etc. The fourth class is coming from the psychological laboratory and consists of experimental studies of such topics as the Psychology and Pedagogy of Reading,

[1]Read at the Wellesley meeting of the New England Association of College Teachers of Education, December 2, 1911.

The Psychology and Pedagogy of Writing, The Psychology of Skill, and the like.

The fundamental idea underlying the works in the first class is that a teacher who knows general psychology can be trusted to apply it in all specific situations arising in the classroom. This idea was clearly formulated by Comenius in *The Great Didactic,* was worked out by Herbart and his followers, and still is one of the most popular points of view in method to-day. For example, Dewey states exactly this thought when he says, "The teacher who is an intelligent student both of individual mental operations and the effects of school conditions upon those operations, can largely be trusted to develop for himself methods of instruction in their narrow and more technical sense—those best adapted to achieve results in particular subjects, such as reading, geography, or algebra." (*How We Think,* p. 46). Bagley, in the preface to *The Educative Process,* points out that his work "covers the field commonly included under the terms, 'General Method,' 'Method of the Recitation,' 'Theory and Practice,' etc.; but it deals with principles rather than with the details of device and 'method'." The writer, so he goes on to say, "is convinced that clear and definite notions of the functions of education and of the laws which govern the educative process will do much toward eliminating the waste of time and energy that is involved in the work of the school." In a word, the faith of *general method* is that there are general principles which can be widely applied in school practice. If a teacher know these, he can make whatever little modification a given situation may demand.

In spite of the fact that there is a most important truth in this position, nevertheless, there are two quite serious weaknesses. In the first place, general principles do not play the part in practice that some think they do. It may take a good general chemist a long time to become a good agricultural chemist. It may take a good general psychologist, or even a good student of education, a long time to become a good teacher. The ideal candidate for a position as railroad engineer is the man who knows general physics, the physics of the railroad engine, and who has the skill from experience to handle the engine. So with the teacher. The ideal teacher

is the one who knows the functions of education, the laws of the educative process in general, the laws of the educative process as manifested in the particular subject taught, and who has besides the skill that comes from teaching. *General method* has ignored or underestimated the fact that general psychology is quite a different thing from the psychology of a given subject of instruction. Induction in history and induction in physics are both induction to be sure, but they are so only in the rough. In the fine, they are very different processes. The second weakness lies in the fact that, in spite of their warnings against it, writers of general method have given us adult psychology rather than child psychology. Things apperceived by a mature mind may not be apperceived by a child's mind. In theory, this last statement is a platitude; but in the schoolroom it is one of the most difficult problems a teacher ever faces. If any one wishes to test these two weaknesses, let him prepare some lessons, say inductive ones. and try them out on a sixth grade class.

Ignoring the second class of books and passing to the *special method* group, we meet with writers who put the emphasis upon the subject-matter taught rather than upon the methods in their stricter sense. Many of these books are excellent and most helpful to the teacher; and yet they have one limitation. They put nearly the whole burden of their work upon the sources and organization of the subject-matter itself, and almost none upon the way the subject-matter organizes itself in the child's mind. This was the second weakness of the first class.

The fourth class represents an almost wholly different view. Here the emphasis is placed on the child's mind as it works through some given element of the curriculum. Men in this field believe it quite futile to talk in an *á priori* fashion about the way the mind acts. For them the significant question is: How does a given mind act in a given situation? W. F. Book's *Psychology of Skill* is an excellent example of this class. This monograph is an experimental study of habit-formation as exemplified in typewriting. Not only are the specific habits studied, but also the more general aspects of mental life connected with the learning process, such as the merging of

smaller habits into larger ones, the effect of fatigue, general health, mental inertia and "warming up," points where interest tended to flag, kinds of practice that counted most for efficiency, etc. The meaning of such work for method is at once apparent. The crucial points in a particular learning process are shown up, and the suggestions offered the teacher are vital and definite, not vague and general. In a word, the psychology deduced grows out of the operation; it is not thrust upon it.

Such work as this might well serve as a model for research work in method. All the factors involved in the case are considered: general psychology, the particular psychology of the subject taught, and the child who is being instructed. The true province of method would seem to lie right here: it is the scientific study of the child's (not the adult's) mind as it acquires a given experience involved in a given piece of subject-matter. There is no way except this to get adult faculty psychology out of method. Under such a view as this, all method becomes essentially special. General method is not ignored, it is elaborated and modified and corrected. Method then becomes a branch of educational psychology; that branch which aims to psychologize definite subject-matter from the child's view point. The logic of the subject is not ignored, nor is the child merely entertained. The effort is to determine just how much of the logic of the subject can be given to the child and just what methods are best to give it to him. One modern writer has defined method in this same manner when he says, "Essentially, a study of teaching is reflection upon the way that subject-matter grows and organizes itself. It differs from psychology in that, while psychology treats of the child in terms of the processes of experience, such as memory, imagination, etc., methods of teaching deal with the ways in which the child gets control of subject-matter. For pedagogical purposes they both deal with the same great problems and are closely interrelated, being two aspects of the same thing, but differing in the point of view from which each is studied." (Charters' *Methods of Teaching*, p. 97).

This conception of method demands that educational psy-

chology do not trail along behind general psychology, but stand on its own feet as an independent science. Within this science method would have a definite and worthy field. It would include what is now called *general method* and a great deal more. In a word, this view of method posits the fact that every subject offers a unique and valuable psychology and pedagogy. Enough has already been done to show that this position offers excellent opportunities. Meumann's *Experimental Pedagogy,* Lay's *Experimental Didactics,* Huey's *Psychology and Pedagogy of Reading,* Thompson's *Psychology and Pedagogy of Writing,* Book's *Psychology of Skill,* Cornman's *Spelling in the Elementary Schools,* Browne's *Psychology of the Simple Arithmetical Processes*—these and others like them have given most encouraging results. It is true that nearly all the work so far has been done in the habit group of studies. Gilbert's *An Experiment on Methods of Teaching Zoology* seems to be the only piece of work outside of this group. The next step will consist in the extension of the investigations already begun and the application of the same methods to the other subjects of the curriculum.

History work, for example, offers some fine problems for this kind of research. An illustration may be taken from the *Report to the American Historical Association by the Committee of Eight on The Study of History in the Elementary Schools.* In discussing the sixth grade course, the committee says that "it must be remembered that the fundamental aim is not to store the child's mind with many detailed facts of general history, but to make certain impressions which shall exercise a guiding influence over the child's intellectual growth, to furnish him with a frame work into which his later reading or study shall place what he acquires." With reference to the content of the course, the report says, "those features of ancient and mediaeval life have been illustrated which explain either important elements of our civilization or which show how the movement for discovery and colonization originated." Regarding method, the makers of the course affirm, "Pupils in this grade are not prepared to study scientific history in its logical and orderly development. But they are prepared to receive more or less definite impressions that

may be conveyed to them by means of pictures, descriptions, and illustrative stories, arranged in chronological order."

To a mature mind, this course seems almost ideal, both in its general statements and in its outline of details. But suppose it is placed in the classroom even in the hands of an excellent teacher. Will not a number of the most signficant questions arise? Can a sixth grade boy or girl acquire any impressions, vague or otherwise, of the march of progress or of world movements? If so, what kind of impressions? Does chronological sequence have any meaning to a child of twelve? Will pictures, descriptions and illustrative stories remain simply pictures, descriptions and illustrative stories, or will they be symbolical of meaning? Granted that they may be the latter, how best make them so? Can a child, from a panorama of imagery, draw an emotional generalization? Or, must the teacher fall back on real scientific induction? If so, how give a student a sense of the *probable* which always goes with such generalization in history? It is apparent at once that the whole course is permeated with adult conceptions and points of view. General method and general psychology can do no more than block out the way in the rough. The teacher's *real* problem then begins: how use induction and deduction, analysis and systhesis, lecture and topic, question and textbook? Induction, for example, does not settle the problem of method: a bigger problem is, how use induction? In avowing his faith in his method by which all things were to be taught to all men, Comenius said, "Thus do the perplexities of one age afford amusement to the next." After 300 years of general method, we still find that it is not amusement to apply its principles. It is high time that we were taking another tack.

It is such problems as these that the student of method faces in the future. The expert educational psychologist alone cannot solve them. Neither can the expert empirical teacher. It will be that rare combination of two, just that combination which Münsterberg, in his *Psychology and the Teacher,* thinks impossible, since the teacher who psychologizes will be likely to lose his sympathy, and hence his art. The newer view of method maintains that it is not

sympathy for the pupil's personality that is needed, but sympathy engendered by insight and directed to a pupil in a particular critical situation. The faith of this newer view of method is that men and women will come forward who can follow appreciatively the child's mind as it works through a given piece of subject-matter and detect in this process the critical points and devise means of meeting them. If this kind of research be not done and be not recorded, then the science of teaching is a misnomer and good school work will have to await the day when there arises a generation of born teaching geniuses.

Last summer the writer spent an hour with an expert manager of a sawmill. This manager related that two years before he had installed in his plant a complex system of belt saws, and had at once met with all sorts of difficulties in setting, filing, and adjusting them. Finally, he was forced to call in a scientific machinist, who, in one day, put them in perfect order. When the machinist was leaving, the manager said to him, "I will give you five hundred dollars if you will explain to me how to fix these saws so that I may do it myself in the future." The machinist replied that he had, after ten years of experience, written a little book which explained the whole process in detail. The manager then described how he had purchased one of these books and set to work to learn the art, and how he had, after a few weeks, mastered the whole task completely. He concluded his story by saying that this little book contained absolutely every thing that was needed. Now, it may be an idle dream, but does not the science of teaching need just such books as this: books on the teaching of writing, reading, spelling, arithmetic, history, and so on? If this ideal does not appear fantastic, then does it not become the duty of students of method to give it a thorough-going testing by working with concrete facts as found in school practice? Few sciences have ever made much progress through purely dialectical methods. Hypothesis forming has been only half the work, testing has been the other half. The so-called science of teaching has an abundance of hypotheses: the other half of the work remains to be done; namely, making these hypotheses face realities.

A TENTATIVE REVISION AND EXTENSION OF THE BINET-SIMON MEASURING SCALE OF INTELLIGENCE.

Part II. Supplementary Tests.—Continued.

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2. The Completion Test.

Ebbinghaus characterizes this method as a real test of intelligence, which, he says, "consists in the elaboration of a whole into its worth and meaning by means of a manysided combination, correction, and completion of numerous kindred associations." Ebbinghaus finds a correlation between this test and intelligence; Wiersma, between capacity in the completion test and native ability; Krüger and Spearman, a correlation of 97 per cent. between capacity in the completion test and the hypothetical "central factor."

One objection to this test is the difficulty in standardizing it. To be suitable for this purpose a selection must have a close logical connection from beginning to end, and the degree of mutilation must be such that the performance is not the result of pure guess work or literary imagination, nor must it be so easy as to require no effort. By experimentation on about two hundred pupils the following form was devised as one which it was hoped would bring out quantitative and qualitative differences. While we used only one text, we would suggest that for a more extended test of the child's ability in this field two or three different tests, varying in sense and degree of mutilation, might well be employed. However, the use of a mutilated text of different degrees of mutilation, such as ours, partially obviates the need of employing a series of texts. The text used was typewritten, with bars (all of same length, ¾-inch) representing blanks. The three cross bars dividing the test form into four parts were not in the text used, but are inserted here for the convenience of the reader.

COMPLETION FORM.

One ——— the eagle met ——— the other ——— to see who could ——— the highest. They agreed ——— he who ——— fly the ——— should ——— called the strongest. All started ——— the same ——— and flew ——— among the cl——. One by ——— they ——— weary and re——, but ——— eagle ——— upward and ——— un—— he ——— a ——— speck ——— the heavens. | After ——— hours, when ——— ——— sure ——— the other ——— had ——— up ——— contest, he decided ——— return to ——— ———. When he ——— back, ——— others ——— ——— for him; and ——— he touched ——— ———, a sparrow ——— off ——— back, where ——— ——— ——— hidden, and ——— that ——— himself ——— ——— strongest ———. | "I ——— stronger ——— the ———," said ——— ———, "for not ——— did I ——— ——— high, but ——— he ——— ——— downward, I came ——— ——— hiding ——— ——— ——— up ——— little ———." After ——— boastful ———, the birds ——— ——— heads ——— shame, ——— ——— ——— council ——— ——— ——— matter. | After ——— ——— ———, they decided ——— ——— ——— was ——— ——— ——— for ——— only ——— he ——— ——— high but ——— car—— ——— ——— ——— well.

To ——— day ——— plumes ——— ——— ——— ——— emblems ——— str—— ——— cour——.

An examination of the text will reveal the fact that there are four progressive degrees of mutilation. These parts are separated by cross bars in the above reproduction. The first part is mutilated to the extent of 33⅓%; the second 45%; the third, 54%; the fourth, 66⅔%. There are several advantages in the use of a graduated mutilation test instead of one of uniform difficulty, just as is the case in any other serial scale. It is equally available for children of several different ages and different degrees of ability. It also tends to prevent scattering of effort in spots over the entire paper. In nearly all cases the children filled in the blanks consecutively, with now and then an omission, so far as they were able in the time given. They got their bearings where the mutilation was slight, and this served to round out their later associations into a logical whole, even though the degree of mutilation was great.

Source of Material.—This test was given to all the pupils in the Palo Alto schools from the fourth to the eighth grades, inclusive. The method was as follows: E explained to the

class that the test to be set before them would be a story from which many words would be found omitted. They were directed to insert only *one* word in every blank space, or, where necessary, complete an unfinished word, and were asked to have, so far as possible, a well connected story when the filling in had been completed. The test papers were then distributed face down, and at a signal from E the papers were turned and work begun. At the end of fifteen minutes, work stopped and the papers were collected.

Scoring.—The usual method of marking such tests, by allowing the same credit for each word correctly inserted, would of course, not be reasonable in this text where the difficulty is not uniform. After the preliminary experimentation with the first graded completion test, the writers decided that to allow credit for each word correctly inserted in proportion to the degree of difficulty of the section in which it came would serve to bring out most clearly characteristic individual differences. The following method was therefore adopted. Each blank in Section I was credited 6 when correctly filled; Section II, 8; Section III, 10; Section IV, 13. The total score for a perfect performance would be 100.2, or approximately 100. One-half of the above credit was given where the words inserted made a well connected story, but were related only in a moderate degree to the thought that should have been given by the printed words. No credit was given for inserted words which did not make sense in their setting, or for words forming a connected story which was purely literary invention, having no connection with the thought given by the printed words. While individual words had to be frequently considered, yet on the whole the inserted words made sense, or the contrary, by series of words or by phrases. Credit was then given to the individual words in proportion as the phrase in which they were placed made sense in its entirety. Thought was considered rather than elegance of diction.

Results.—Table VII summarizes the results by years. It should be noted that the table shows for each year the grade reached or surpassed by two-thirds of those tested at that year, as well as median performances by years. Two samples of widely differing performance are also inserted.

TABLE VII.

COMPLETION TEST.—SUMMARY.

Age.	Number Tested.	Median Mark.	P. E.	Two-thirds Pass.
9	32	18.4	8.5	14.9
10	39	29.2	11.8	20.4
11	52	32.2	11.1	25.2
12	56	34.2	11.7	25.6
13	57	45.9	15.2	36.6
14	33	48.5	9.4	42.8

Sample of an excellent performance by a fourteen-year-old S.
Grade 100.

One [day] the eagle met [with] the other [birds] to see who could [fly] the highest. They agreed [that] he who [could] fly the [highest] should [be] called the strongest. All started [at] the same [time] and flew [up] among the cl[ouds]. One by [one] they [grew] weary and re[turned], but the eagle [flew] upward and [upward] un[til] he [became] a [tiny] speck [in] the heavens. | After [two] hours, when [he was] sure [that] the other [birds] had [given] up [the] contest, he decided [to] return to [the earth]. When he [came] back, [the] others [were waiting] for him; and [as] he touched [the ground] a sparrow [flew] off [his] back, where [it had been] hidden, and [said] that [he] himself [was the] strongest [bird]. | "I [am] stronger [than] the [eagle]," said [the sparrow], "for not [only] did I [fly as] high, but [when] he [flew on] downward, I came [from my] hiding [place and flew] up [a] little [way]." After [this] boastful [story] the birds [dropped their] heads [with] shame, [and they held] council [to decide the] matter. | After [having the council] they decided [that the eagle] was [the stronger bird], for [not] only [did] he [fly so] high, but [he] car[ried the sparrow as] well.

To [this] day [his] plumes [are worn as the] emblems [of] str[ength and] cour[age].

Sample of poor result and badly scattered effort by a twelve-year-old S., who tested much below normal.
Grade 17.9.

One [day] the eagle met [crane] the other [was] to see who could [be] the highest. They agreed [that] he who [could] fly the [other] should [not] called the strongest. All started [at] the same [time] and flew [through] among the cl——. One by [one] they [went] weary and re[ach], but [the] eagle [went] upward and [crane] un[der] he [touch] a [little] speck [of] the heavens. | After [the] hours, when [the others] sure [and] the other [who] had [goin] up [to] contest, he decided [he] return to [back again]. When he [fell] back, [the] others [ran up] for him; and [when] he touched [the ground] a sparrow [fell] off [his] back, where [he was lieing] hidden, and [hid] that [he] himself [was not] strongest [all]. | "I [though] stronger [than] the [others]," said [the stranger], "for

not [as] did I [but to] high, but [when saw me] downward, I came [up from] hiding [and he look] up [and] little [while]." After [while] boastful [were] the birds [with great] heads ——— shame, [to join great] council [in the was] matter. After [while when they] they decided [about where there] was [a] ——— ——— for ——— only ——— he ——— ——— high but ——— car—— ——— ———, ——— well.

To ——— day——— plumes ——— ——— ——— ——— emblems ——— str—— ——— cour——.

The results show clear differences in performance from year to year, except in the 12th year, which showed hardly any gain over the 11th. This test, therefore, fulfills the most important requirement for use in a measuring scale of mentality. We believe that it brings to light fundamental differences in the thought processes, and affording as it does a more extended performance than most of the short Binet tests, it seems to us of corresponding greater value than most of the latter. For clinical purposes, however, it will have to be determined how and to what extent an S's performance is influenced by taking the test with a group instead of individually.

3. Ball and Field Test of Practical Judgment.

Another test introduced for a try-out was the following: E draws a circle about three inches in diameter on a sheet of paper, leaving a small gap which is called a gate. S is then told that this circle represents a round field, that in this field a base-ball has been lost, that we have no idea what part of the field the ball is in, only we know that it is somewhere in the field. S is then asked to take a pencil and mark out a path showing what direction he would walk in hunting the ball. To make clearer what is wanted, E takes the pencil and marks the path as far as the gate, then gives the pencil to S. Before S begins, however, he is further informed that the field is covered with grass about six inches high, so that the ground cannot be seen clearly farther than ten feet on each side of him. E then adds "What direction will you go so as to be sure not to miss the ball?"

An examination of the results showed that four grades of performance could very readily be distinguished. The younger children gave no evidence of any rational plan of procedure, further than to fill up the entire field with marks. Their lines

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were not parallel, were frequently crossed and re-crossed, and often were broken. By "broken" it is meant that the pencil was lifted and set down again at another part of the field. This general absence of plan was scored 1. Somewhat older children showed, as a rule, some degree of plan. If the lines were partly but not entirely parallel, only very slightly broken and seldom crossed, or if there was some other poorly adopted procedure, such as lines radiating from the center like spokes, the score 2 was given. If the lines were almost perfectly parallel (whether spiral or straight), not at all crossed or broken, the score was 3. Score 4 was given when in addition to the performance for score 3, S showed that he had taken into consideration the fact that the ground was visible only 10 feet on either side of him, and that the lines could be 20 feet apart, except around the border where the path had to approach within 10 feet of the fence. It was easy to ascertain by a question or two whether this had been taken into account. Figure III gives reproductions of typical reactions to this test.

The ball and field test was not introduced until more than half the tests had been completed. In all, 113 children were given this problem, with the results shown in the following table.

TABLE VIII.

Age.	Number of Cases.	Score.			
		1	2	3	4
4	2	2	0	0	0
5	3	3	0	0	0
6	3	3	0	0	0
7	4	2	2	0	0
8	11	1	7	3	0
9	26	3	11	12	0
10	17	1	3	13	0
11	21	2	3	16	0
12	17	1	5	10	1
13	5	0	1	3	1
14	4	0	0	2	2

Score 2 may, therefore, be set provisionally as a standard performance for the eighth year, score 3 for the tenth year, and score 4 somewhere above the thirteenth year.

On the whole this is a test which seems worthy of a much more thorough trial than it has had in our series. It is easily and quickly given, attracts the interest of the S, and gives a performance which lends itself to standardization. A

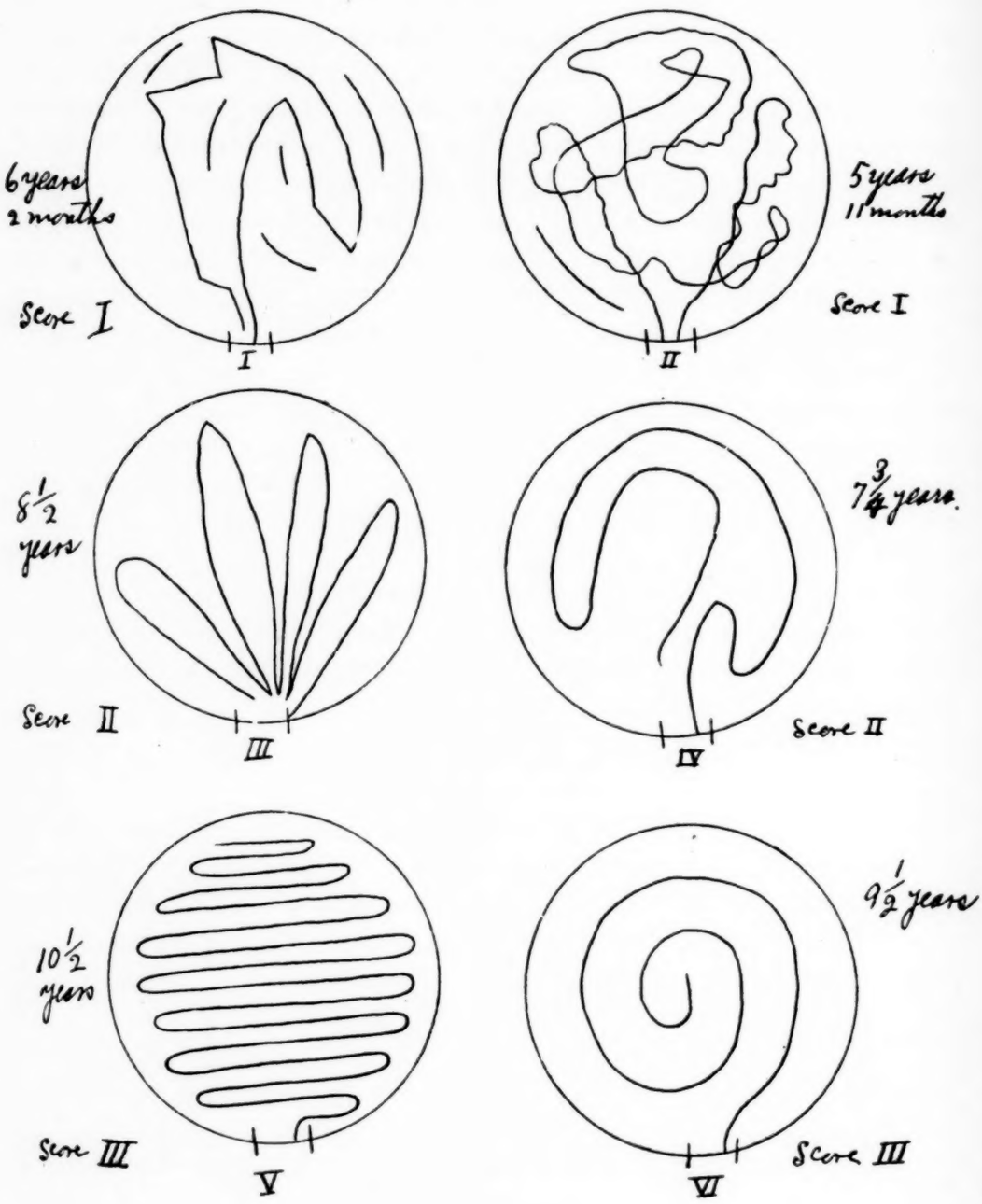
6 years 2 months
Score I
I
5 years 11 months
Score I
II
8 1/2 years
Score II
III
7 3/4 years.
Score II
IV
10 1/2 years
Score III
V
9 1/2 years
Score III
VI

FIGURE III.

few tests of this general type are much needed to round out the Binet scale, but unfortunately unobjectionable tests of this kind are hard to devise. The problem set may be too easy or too difficult, it may permit of a mechanical solution, or it may give too large a play to the element of chance and thus approximate the puzzle. The ball and field test meets these requirements and offers striking development in performance with increasing age. For example, plans II, IV and VI of the illustrations above reproduced are the performances of three sisters, aged 5-11, 7-9 and 9-6, respectively.

A somewhat more difficult form of this same test is now being used with older children and adults.

4. The Vocabulary Test.

The experiments of Kirkpatrick and Whipple show that it is possible to ascertain with serviceable accuracy the size of an individual's vocabulary by means of a test of 100 words properly selected. Considering the facility with which such a test may be applied, the relative ease of establishing age norms, and the suggestiveness for clinical purposes of the quality as well as the quantity of definitions given, it would seem that some kind of vocabulary test ought to be devised for use in each year. Its application requires only from five to fifteen minutes, and its results are much more significant than the scattering definition tests used by Binet in years 6, 9 and 13 of his scale. If the vocabulary test is given, the Binet definition tests may be omitted.

It has seemed to the writers that a vocabulary test to be used upon children and as a part of a measuring scale of intelligence should be based in so far as possible upon the mass of familiar words employed as the vehicles of the most common and therefore presumably the most fundamental concepts in general use. The more it is desired to measure intelligence rather than the effects of training, the more necessary it becomes to make the selection from a representative list of fundamental terms instead of from a complete list of language units. The more complete the list from which the selection is made, the more it tends to reveal accidents of training rather than real intelligence. For our present purpose, therefore, the complete or un-

abridged dictionary is not to be considered. Kirkpatrick's test is based upon Webster's Abridged Dictionary, containing 28,000 words. Even this has a very large proportion of words the interpretation of which depends upon the technical training, as is indicated by the fact that Kirkpatrick's test gives even for college students an average vocabulary index of only about 70%. In other words, more than one-fourth of the words are so technical that highly selected young men and women of this extended academic training can not define them. Casting about for a fairer test of intelligence the writers, after some preliminary trials, have arranged a list of 100 words selected from Laird and Lee's Vest-Pocket Webster Dictionary, 1904 edition. This dictionary meets the above specified requirements more nearly perhaps than any other, containing as it does about 18,000[1] of the most basic words of the language. Taking the last word of every sixth column gave the following representative list of 100 words used in our test:

VOCABULARY TEST.

afloat	frustrate	philanthropy	achromatic
apish	gelatinous	plumbing	ambergris
artless	gown	pork	cameo
avarice	guitar	priceless	casuistry
haste	harpy	promontory	complot
bewail	herd	puddle	declivity
bonfire	hysterics	quake	exaltation
brunette	impolite	ramble	fen
charter	insure	reception	hookah
civilly	irony	regard	incrustation
coinage	juggler	reposing	infuse
conscientious	lecturer	roarer	laity
copper	lotus	rule	limpet
crunch	majesty	scorch	ocher
curse	Mars	shrewd	paleology
depredation	mellow	skill	pärterre
dilapidated	milksop	snip	perfunctory
disproportionate	misuse	southern	piscatorial
drabble	mosaic	sportive	precipitancy
easterly	muzzle	stave	retroactive
embody	nerve	straw	sapient
envelope	noticeable	swaddle	selectman
eye-lash	orange	tap	shagreen
flaunt	outward	tolerate	sudorific
forfeit	peculiarity	treasury	theosophy

[1]The publishers incorrectly state the number as 30,000.

As already stated, all the vocabulary tests were given individually. The child looked at the word, heard it pronounced, and then gave its meaning orally. E did not write down the definitions (only in case of exceptional or peculiar answers), but scored them as given. We believe, however, that a *qualitative* analysis of the verbatim definitions of children of different ages and mentality would be of great value.

In scoring, full credit was allowed for one correct meaning given (regardless of whether that meaning was the most common one), and half credit for a definition which was partially correct. No value was attached to the logical form employed in the definition, since the test is meant to explore the range of ideas rather than the evolution of thought forms. When it was clear that the child had one correct meaning for a word he was given full credit for it, however poorly the definition may have been stated. The difficulty comes in deciding when a meaning is "correct," since definitions may be of all grades of excellence. Individual differences in E's will inevitably appear here, and in order to minimize them it may be necessary ultimately to indicate definitely for each word what definitions are acceptable, what deserve half credit, what none.

Whatever standard of excellence is accepted it is bound to be more or less arbitrary. Almost every word has several different usages, to say nothing of the innumerable delicate nuances of meaning due to differences in contextual setting. Besides, our own stores of meanings are never garnered as unchanging units of intellectual riches, but instead are constantly undergoing transformation, substitution, amplification and revision. To ascertain that one S has half the vocabulary that another has, as measured by this test, may be of value in estimating their difference in ability, but it does not by any means fully represent the extent to which they differ in language mastery.

On the whole, leniency is to be commended in judging the definition for the reason that the child's power of expression runs farther behind his understanding than is true of adults, and also because for the young S the word has probably a relatively less unitary existence. We are all at a disadvantage in defining isolated words, the child doubly so. To give an idea of the standard of perfection employed in the tests

the following illustration will be of service: Afloat, "a ship floats on the water (full credit); civilly, "its when you treat a person nice" (full credit); hysterics, "you act funny or crazy" (full credit); majesty, "what you say in speaking to a king" (full credit); copper, "something you make money out of" (full credit); sportive, "to like sports" (half credit); pork, "meat" (half credit only unless kind of meat can be specified). It is seen from this that a very liberal standard has been employed. Questioning for the sake of drawing out meanings was not resorted to except in rare instances to overcome the child's timidity. Usually the responses were quickly made and not infrequently the most absurdly incorrect definitions were struck off with amazing confidence.

The vocabulary list was not devised until a large part of the testing had been completed, hence we have data for only 161 cases, ranging from 5 to 13 years of age. The following table shows the main results:

TABLE IX.

The Growth of Vocabulary as Indicated by the New Vocabulary Scale Applied Individually and Orally.[1]

Age.	Median Age.	Median Test Age.	Number of Pupils.	Median Vocabularly.	Vocabulary Reached by Two-thirds.
6	6.5	7.5	5	2500	2300
7	7.5	8.3	14	2600	2300
8	8.5	9+	28	3960	3600
9	9.5	10—	35	5000	4000
10	10.58	10+	24	6000	4500
11	11.5	11	29	6100	5500
12	12.4	11.5	19	7700	6500
13	13	11.5	7	8800	7400

[1]It is not at all certain, of course, how written and mass tests would compare with these results, though presumably they would give a somewhat lower index.

With the exception of year 6, where the cases are too few to afford even a tentative norm, it is seen that the vocabulary index shows a fairly stead growth. For further experimentation the point reached or passed by two-thirds of the children of any year will be tentatively assumed as the test norm for that year. Our test, as may be seen by comparison, gives a larger percentage index than Kirkpatrick's, because it is composed of words on the whole somewhat more common; but it necessarily gives on the average a smaller absolute vocabulary since it is based on 18,000 instead of 28,000 words.

(Concluded in the May number.)

MICHIGAN STATE NORMAL COLLEGE
TRAINING SCHOOL DEPARTMENT.

PERIODS OF WORK IN LEARNING.

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SUMMARY.

In learning to associate numbers with letters, it is more economical within limits to shorten the periods of work and to distribute them correspondingly over a given period of time. The most favorable length of period for this work seemed to be between ten and twenty minutes.

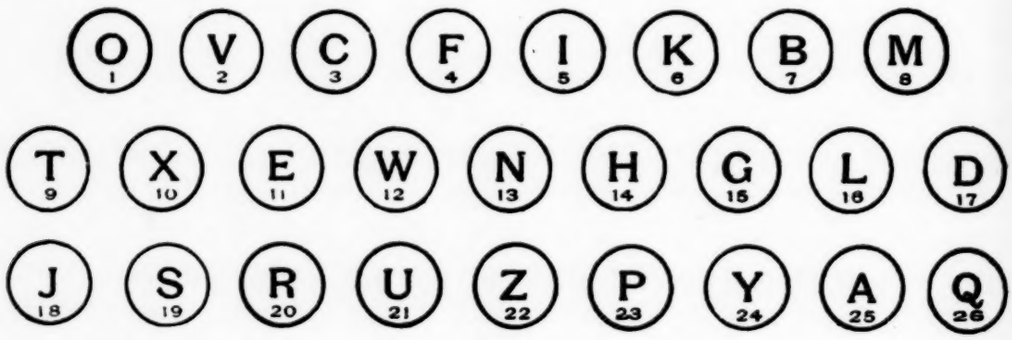
The effect of the distribution and length of periods of work upon the rate of learning has been studied by various investigators. Ebbinghaus[1] found that in learning a series of twelve syllables, sixty-eight repetitions made in immediate succession were not as advantageous for later relearning as thirty-eight repetitions distributed over three days. Jost[2], also working with syllables, found that two repetitions a day for twelve days were better than four repetitions a day for six days, and the latter were better than eight repetitions a day for three days.

The problem of the present investigation was to determine whether this principle of the distribution of repetitions holds in other fields of learning, and whether it also applies to longer periods than the few minutes that the experiments of Ebbinghaus and of Jost required.

The learning process consisted in associating a number with each letter of the alphabet. The material used in the experiment consisted of six blanks each containing a "keyboard" of letters and numbers at the top, and connected prose on the left-

[1]Ebbinghaus, Grundzüge der Psychologie, Zweite Auflage, 657.

[2]Jost, Die Assoziationsfestigkeit in ihrer Abhängigkeit von der Verteilung der Wiederholungen. Zeitschr. f. Psych, *1½*, 436.



Q=26

sentences of Latin or Greek, he cannot get through a simple sum of arithmetic, without making a slip at some stage of the process, because he loses his attention. Year after year he goes on indulging this slovenly habit of mind; the remonstrances of teachers are of no avail; he will not take the pains to be cured; the inaccurate desultory knowledge of many things is more acceptable to his mind than the accurate knowledge of a few, and so he grows up and goes into life unfit for any intellectual calling, unfit for any business or profession. Then again there is another kind of inaccuracy which consists in ignorance of the first principles or beginnings of things; when the student has to go back not without difficulty, for there is always a painfulness and awkwardness in learning last what ought to have been learned first. We all know what is meant by a man being "a bad scholar," which to one who has studied Latin and Greek for ten or more years of his life is justly held to be a reproach. And there are bad scholars, not only among students of Latin and Greek, but in every department of knowledge, in Mathematics

hand margin. Figure 1 shows one of the blanks in reduced form.[3] Each letter is enclosed with a number in a circle. The work consisted in learning to transcribe the prose into numbers by writing the appropriate numbers into the squares opposite each line of print. As the work progressed the numbers were gradually associated with their corresponding letters, which resulted in greater speed of transcription.

In order to determine the relative advantages of different periods of work, the persons participating in the experiment were divided into four groups. The first group worked ten minutes at a time twice a day for six days. The second group worked twenty minutes at a time once a day for six days. The third group worked forty minutes at a time every other day for six days. And the fourth group did the entire task at one continuous sitting. In each case the total time was 120 minutes. The subjects worked at the same time of each day as nearly as possible. Those working twice a day had an interval of at least five hours between the two periods. Each person was instructed to make a check mark at the end of every five minutes of work. This could be done without much disturbance by having a watch near by and starting when the minute hand was on a number.

Forty-two students took part in the experiment: twelve in group one, fourteen in group two, nine in group three, and seven in group four.

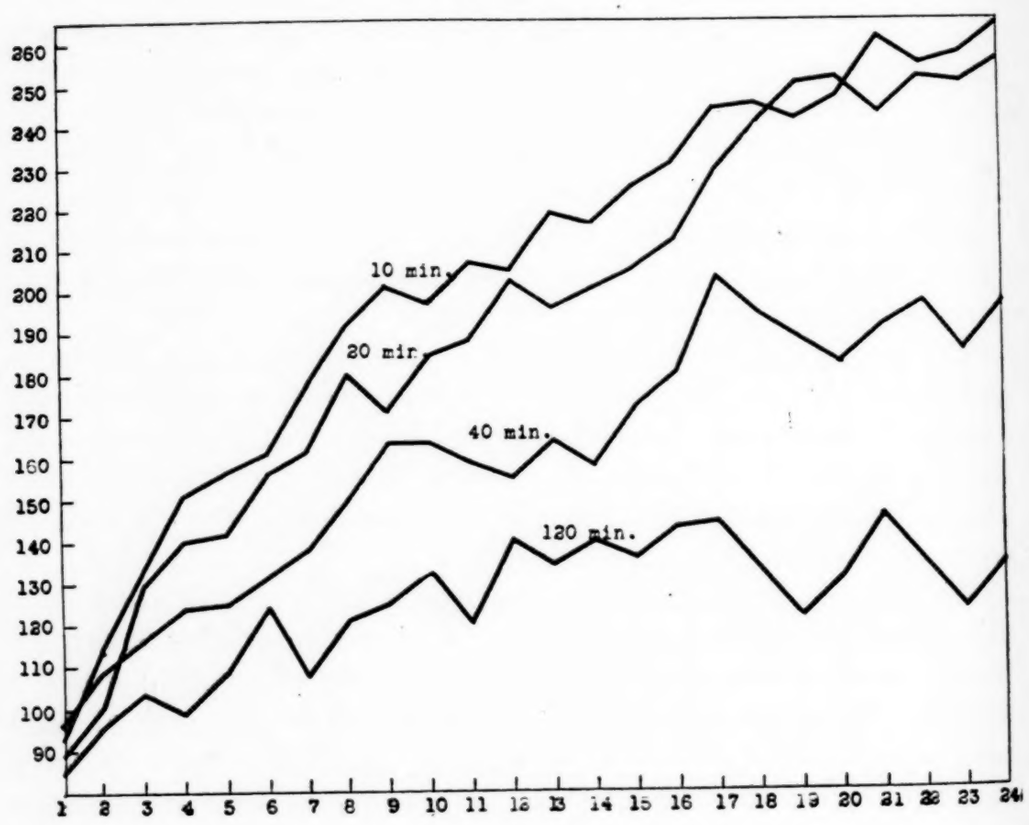
The results are set forth in Fig. 2. The units on the base-line represent the successive five-minute periods and the vertical units represent the number of letters transcribed in each five minutes. The designations, ten minutes, twenty minutes, etc., above each curve indicate the lengths of the periods of work of the different groups.

Within the limits of the experiment the records show that the shorter and the more numerous the periods of work are the more rapid is the improvement. The curves begin close together, but after the first few minutes of work they at once begin to spread. The ten-minute group climbs most rapidly, the twenty-minute group is a close second, the forty-minute

[3]This blank is slightly modified from one devised by Professor Jastrow several years ago.

group is third but considerably lower, and the two-hour group is a distant fourth.

If still shorter periods of work than the ones employed in the experiment were tried, the probability is that there would be a limit of economy in distributing and shortening the periods. This is indicated by the fact that the advantage of the ten-minute group over the twenty-minute group is not as great as the advantage of the latter over the forty-minute group. The twenty-minute group averaged thirty-one letters more in every five minutes of work than the forty-minute group, whereas the ten-minute group averaged only ten letters more than the twenty-minute group. The indication is that the advantage of still greater distribution and shortening of periods of work would be overbalanced by the loss of adaptation or "warming up" at the beginning of each period. There is, quite obviously, a point of diminishing returns, an optimal



distribution and length of the period of work beyond which the expenditure of energy becomes less economical.[4]

Why are shorter and more numerous periods more economical? The main reason, no doubt, is the well-known fact that a period of rest after newly formed associations gives them a chance to become settled and fixed. The slower rate of improvement of the third and fourth groups is due in part to fatigue. The forty-minute group shows no gain in the last period, and the two-hour group shows no improvement after the first hour. A third minor factor was that those working for a short period at a time were more apt to work with maximum concentration than those working for longer periods.

[4]This assumption is corroborated by a similar experiment made by Dearborn, if I correctly interpret his data. The group working ten minutes once a day did better than the group working twice a day, five minutes at a time. Here the distribution has apparently gone beyond the optimal point. Dearborn, Experiments in Learning, Journal of Educ. Psych. 1, 383.

ACQUISITION AS RELATED TO RETENTION.

NAOMI NORSWORTHY.

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SUMMARY.

Eighty-three students were tested for their rate of learning and their ability to recall immediately after the learning period and after a lapse of thirty days. The more rapid learners showed the higher percentage of recall in both tests.

The object of this experiment was to ascertain the relationship between rate of learning and power of retention. The subjects were 83 mature students who were in a class in educational psychology, and who were interested in proving the truth of the maxim, "Easy come, easy go." The material used was a German-English vocabulary of 1200 words, prepared by Professor Thorndike. There were two sets of papers—the study set and the test set. On the former were the German words with their English equivalents, on the latter the German words only. The words were arranged in numbered groups of ten, the corresponding groups in the two sets containing the same words, the order within each group being different. Each student studied twenty minutes a day for five consecutive days, using the study set and memorizing at least forty words, and as many more as she could each period. At the end of the study period she took the test set and wrote in a book provided for the purpose the English equivalents of the words studied. At the end of the five days each student had studied at least 200 words. Two days of rest were allowed and the work was repeated with the same list. After two more days of rest the words were studied for a third time. At the close of the third week each student had studied three times at least 200 words, and as many more as

she could. As a matter of fact, no student had stopped with the 200, but each one had done more than that minimum. Before the work was begun each student had gone over the entire list of words in the test series, and written the English equivalents of any which were familiar. These were subtracted from the number learned in determining the amount accomplished during the experiment.

At the first meeting of the class after the study periods were over they were asked to write the English equivalents of fifty German words chosen from among the 200 which had been studied three times. A month after this test another series of fifty words, chosen in the same way, was given. The students expected the first test, but knew nothing of the second test.

The results are given in Table I. Column I is the total number of words correctly memorized during the practice periods, minus the number known before beginning the experiment. Column II is the percentage of words remembered correctly at the first test. Column III gives the deviation of each record from the median per cent. remembered. Column IV gives the percentage of words remembered four weeks after the first test. Column V gives the deviation from the median.

TABLE I.

	I.	II.	III.	IV.	V.		I.	II.	III.	IV.	V.
No.	No. of words correctly learned.	Per cent. remembered in first test.	Dev. from Med.	Per cent. remembered in second test.	Dev. from Med.	No.	No. of words correctly learned.	Per cent. remembered in first test.	Dev. from Med.	Per cent. remembered in second test.	Dev. from Med.
1	923	72	+ 9	76	+14	43	440	65	+ 2	50	—12
2	800	64	+ 1	78	+16	44	435	88	+25	70	+ 8
3	730	78	+15	71	+ 9	45	431	92	+29	90	+28
4	720	77	+14	68	+ 6	46	431	68	+ 5	64	+ 2
5	709	72	+ 9	78	+16	47	425	60	— 3	48	—14
6	704	96	+33	100	+36	48	425	46	—17	46	—16
7	698	82	+19	82	+20	49	423	63	0	60	— 2
8	692	62	— 1	70	+ 8	50	409	38	—25	36	—26
9	690	75	+12	75	+13	51	405	36	—27	18	—44
10	672	78	+15	88	+26	52	403	42	—21	30	—32
11	655	88	+25	88	+26	53	389	56	— 7	60	— 2
12	642	73	+10	74	+12	54	388	52	—11	34	—28
13	619	79	+16	80	+18	55	380	21	—42	36	—26
14	609	70	+ 7	62	0	56	375	54	— 9	56	— 6
15	590	75	+12	62	0	57	373	42	—21	32	—30
16	588	72	+ 9	72	+10	58	368	52	—11	—	—
17	581	36	—27	52	—10	59	368	39	—24	60	— 2
18	580	69	+ 6	56	— 6	60	362	—	—	8	—54
19	577	79	+16	82	+20	61	360	36	—27	36	—26
20	570	65	+ 2	48	—14	62	355	52	—11	48	—14
21	563	90	+27	94	+32	63	353	31	—32	22	—40
22	563	82	+19	88	+26	64	346	60	— 3	64	+ 2
23	560	75	+12	68	+ 6	65	346	40	—23	40	—22
24	560	41	—22	28	—34	66	320	78	+15	—	—
25	549	86	+23	90	+28	67	319	50	—13	—	—
26	547	58	— 5	88	+26	68	317	58	— 5	48	—14
27	547	50	—13	48	—14	69	314	51	—12	14	—48
28	540	70	+ 7	14	—38	70	280	73	+10	42	—20
29	533	62	— 1	92	+30	71	270	55	— 8	—	—
30	531	33	—20	54	— 8	72	256	0	—63	—	—
31	525	84	+21	84	+22	73	250	29	—34	0	—62
32	513	66	+ 3	68	+ 6	74	220	23	—40	80	+18
33	504	51	—12	86	+24	75	220	23	—40	4	—58
34	486	49	—14	68	+ 6	76	218	54	— 9	44	—18
35	485	67	+ 4	24	—38	77	214	82	+19	76	+14
36	482	88	+25	90	+28	78	210	89	+26	20	—42
37	480	65	+ 2	62	0	79	210	31	—32	10	—52
38	478	81	+18	66	+ 4	80	209	—	—	48	—14
39	472	70	+ 7	—	—	81	208	54	— 9	—	—
40	469	66	+ 3	—	—	82	200	40	—23	22	—40
41	468	61	— 2	82	+20	83	177	50	—13	52	—10
42	447	77	+14	64	+ 2						

In Table II these results are condensed. Column I gives the number learned. Column II the average deviation from the median for each group in the first test. Column III gives the average deviation from the median for each group for the second test. Those students who learn more than the median number of words are also above the median in the two tests of retention, and vice versa. The rapid learners retain more than the slow learners.

TABLE II.

No.	I. No. Words Correctly Learned.	II. Av. Dev. from Med. First Test.	III. Av. Dev. from Med. Second Test.
1.....	700 or over.	+14	+16
2.....	600	+13	+15
3.....	550	+ 5	+ 2
4.....	500	+ 0.3	+ 8
5.....	450	+ 5	+ 3
6.....	400	— 2	—10
7.....	350	—20	—23
8.....	300	— 7	—21
9.....	Under 300	—17	—26

The average per cent. remembered in the first test by the top half of the class was 70; for the lower half the per cent. was 52. The first quarter of the class remembered 75%; the fourth quarter 50%. The first group, who memorized at least 900 words, has an average of 76% remembered; the ninth group, who memorized under 300 words, an average of 46%. The same relation holds in the second test a month later. The rapid learners having retained a larger per cent. than the slow learners. Table III shows these results. The Pearson coefficient of correlation between the number learned and the average number remembered in the first test is .41; with the second test it is .50. The coefficient of correlation between first and second test is .60.

TABLE III.

Number.	Av. Per Cent. Remembered First Test.	Av. Per Cent. Remembered Second Test.
First Half of Class.....	70	73
Second Half of Class.....	52	47
First Group.....	76	78
Ninth Group.....	46	36

The results of this experiment coincide with those reported by Dr. Pyle in the June number of this JOURNAL—namely, a positive correlation between rate of learning and retention. The method differs from those hitherto reported, in that the time remains constant and the amount learned varies. This frees the student from the responsibility of deciding when he has thoroughly memorized the material—a responsibility which brings a very varying personal equation into the problem. It also frees the investigator from the burden of making a fair allowance for imperfectly learned material.

The difference between the quick and slow learner in the ability to retain is probably even greater than the figures show. The students who learned three times as many words as others not only spent a shorter time in acquiring the 200 words on which they were tested, but also had possible interference from the added vocabularies learned, and had to retain the 200 for a longer period of time. The quickest students must have completed their review of the 200 words from which the test words were drawn, in the first study period of the third week, while those who were the slowest could only have completed them perhaps one period before the test. The quick ones were therefore tested on material held from a day to a week longer than the slow ones.

COMMUNICATIONS AND DISCUSSIONS.

PHONETIC KEYS AND THE SCIENTIFIC ATTITUDE.

Editor Journal of Educational Psychology:

Dear Sir—I am in receipt of a collection of documents which so well illustrate an attitude that is unfortunately met with occasionally in scientific circles, and so impedes the progress of the discovery of truth, that it seems worth while to point out its unscientific character.

These documents comprise a letter from the president of the Iowa State Teachers' College and five replies to this letter by certain individuals who apparently made up the committee to report on the universal key-alphabet.

Personally, I am not interested in the key-alphabet. I don't know one kind from the other, but I am interested in children and in their education, and I gather from one of these letters that the comfort, welfare and happiness of children is somehow concerned with this question of the adoption of a key-alphabet. To an outsider like myself, having an interest in the child, the situation appears as follows:

Somebody has proposed a universal key-alphabet which was endorsed by the Department of Superintendence at Mobile, Ala., in February, 1911.[1] A certain psychologist has taken the trouble to determine by experiment whether this proposed key-alphabet is adapted to children and is better for them than the old so-called Webster alphabet. These results have been published. The aforesaid president of the Iowa State Teachers' College sends a letter to certain gentlemen, in which he says: "I desire to have your views regarding the value of the Whipple tests, as well as your reasons why the Department of Superintendence should not reconsider the action then taken."

It will be noticed that he does not ask whether the action should be reconsidered, but wishes reasons why it should not be reconsidered. As for the gentlemen whose answers are published, it may be

[1]This action was rescinded at the St. Louis meeting, February, 1912.—*Eds.*

said that they have merely given what was asked for. President Seerley does not tell us how many opinions were solicited, how many were received or whether he reproduces all of those that were received.

The five answers published, taken as a whole, are among the most remarkable documents ever presented in a controversy. So far from evincing a desire for truth, the spirit of all five reminds me of the famous advice of the counsel for the defense to his colleague, in which he said: "We have no case; abuse the plaintiff's attorney." The way in which these worthy gentlemen abuse the psychologist who has made this investigation leads the reader to believe that they are more desirous of seeing their own opinions win than they are to have the truth.

One of these gentlemen (?) even goes so far as to insinuate that the investigator has brought in results and settled his verdict to please the men who paid the bill. Surely there is an ethical code in academic circles which forbids one member of the profession to make such an insinuation in regard to another. Why, even politics is outgrowing that sort of thing! We recently held a Gubernatorial contest in our State of New Jersey in which there was nothing of this kind from either Democrat or Republican ranks. Each party to the contest treated the other as a gentleman throughout the struggle. Shall we in the scientific and literary realms acknowledge that our code is lower than that of the politician?

But for the argument. I find nowhere in these letters any suggestion that the matter should be decided in accordance with examinations of children, but rather that the question has already been decided, and must be forced upon the children by the weight of the authorities who have adopted the revised key. Only two of the letters make any suggestion as to wherein the investigator has erred, and wherein, consequently, his results are not satisfactory; and these suggestions are in the midst of longer paragraphs which amount almost to abuse of the investigator.

One writer remarks that the investigator's results are contrary to reason. He says, "One has only to look at the two alphabets to see which is the shorter, the simpler, the easier to write and the better adapted to mnemonic processes." This gentleman should be informed that most of the discoveries of science have been considered contrary to reason at first.

Another one of these writers says: "The pupils of this country deserve the best, and should not be forced to ride in a mediaeval cart instead of a modern carriage," and then naïvely adds: "We should find a specialist, a phonetician, a philologist or one informed as to modern methods of teaching English." If the proposed key is solely for the use of specialists, phoneticians, philologists, and the like, we may agree with this; but if it is for the use of *children,* how absurd is such a method of determining its value! Not only do these writers contradict themselves, but they contradict each other. One lays great stress upon the fact that the revised alphabet is much easier to learn than the old. Another one declares with emphasis that the time involved in learning the alphabet makes no difference. Another one refers to the "apparently biased tone" of the investigator. To the reader of these letters this is amusing, in view of the evidently biased tone of all the writers.

Finally, another writer admits that the proposed key alphabet is not perfect, and could be advantageously changed in details. To this, one is tempted to say, "If it can be improved, why insist upon forcing this alphabet upon the children without first making it as perfect as possible?"

I am making no attempt to point out *all* the illustrations of bad logic and wrong spirit in these letters, but only enough to call the reader's attention to their general tenor and tone.

In conclusion, may I make a suggestion? Why could not these gentlemen have been big enough to say, "Here is someone who proposes to submit these two alphabets to a careful test to determine which one of them is best adapted to childhood. His experiment is not quite satisfactory to us, but the idea is a good one. Let us have more experiment and abide by the result. If the revised alphabet is not the best, then let us have the best." But it is discouraging, or it would be, if there were any very considerable number of scholars who proceeded in this prejudiced way, to find these gentlemen taking the course they have of making ungentlemanly insinuations as to the honesty of the investigator and urging their claims by the sheer force of their names and authority. Have we not a higher code than this, and if we have it not, may we not create such?

HENRY H. GODDARD.

Vineland, N. J.

MENTAL MEASUREMENTS IN SCHOOLS.

In the December number of THE JOURNAL OF EDUCATIONAL PSYCHOLOGY there appeared an article on "Methods of Mental Measurements in Schools and Colleges," in which the point was made that the results of group tests be recorded as compared to the group average, letting that average appear as 50. Several arguments were advanced in favor of this system, among which was the valuable consideration that results would become much more intelligible to laymen. It is difficult to see, however, why the writer should have chosen as the base of his system of records the number 50 when the per cent. basis would have met all his requirements, and, in addition, would employ the common language of ratios.

That per cents are much more intelligible to laymen than are other form of comparison may not be appreciated by one very familiar with mathematics, but observation will show that it is true. Recently in connection with the question of dividing a certain class into sections I had occasion to compute the coefficient of correlation between arithmetic and geography grades. The coefficient was found to be 0.635. I found it difficult to make this mean much to the other persons involved in the discussion until it occurred to me to mention that this meant 63½ per cent. of correlation. I found the meaning then became plain. Similarly it would be clearer to say that a pupil taking the watch test for hearing was graded at 105 per cent. of the average than to say that his score was 52½. In the latter case the base of 50 might easily be overlooked, whereas the term per cent. indicates the base number.

Other advantages for recording data in per cents of an average have come to my notice while employing this method in arithmetic tests. In order to make the point clear I give below a brief test so recorded. The scores are entered in terms of per cents of the group average, and next in terms of the standard determined by Prof. S. A. Courtis, so that pupils may readily compare themselves with their own group and with the standard determined by wider experimentation. The preparation of these columns of percentages requires very little labor, since they may be read from a slide rule; or, where the basis of comparison is an established norm, tables may be prepared from which the per cents may be directly copied:

READING ADDITION COMBINATIONS, NINTH GRADE. TIME, 1 MIN.

Score.	Cases.	F. V.	Per cent. of Av.	Per cent. of Standard (65).
90	2	180	134	138
88	1	88	131	135
82	1	82	122	126
76	1	76	113	117
75	2	150	111	115
73	1	73	108	112
72	2	144	107	111
M. 70	1	70	M. 104	M. 108
66	1	66	98	102
64	1	64	95	98
61	1	61	91	94
60	2	120	89	92
54	1	54	80	83
52	1	52	77	80
48	1	48	71	74
46	1	46	68	71
40	1	40	59	62
	21	1414	A. D. 17.4	Av. 104

Av. 67⅓ additions.

In the arithmetic tests commonly used it is customary to compute average deviation rather than standard deviation. Using the column of per cents of the average, the experimenter can very easily do this. The deviations above the average may be read by dropping the hundreds; these are multiplied by the frequencies and added. By doubling the sum so obtained the computing of the deviations below 100 may be omitted, since they must equal those above. It will be observed that the A. D. thus obtained is a coefficient of variability, and admits of direct comparison with similar results from other data with varying averages or dissimilar units. Of course, if the A. D. is required in the units employed in the test it may be obtained by multiplying by the average expressed in the original units.

Records such as the above are frequently employed in computing the coefficient of correlation, since comparisons may be desired with rate of motor activity, memory span, etc., and in this case standard deviation must be found. The per cents will be found very convenient for this purpose, since the deviations above and below are easily written by inspection, and the somewhat tedious process of correcting for the estimated average is avoided.

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DANGER SIGNALS IN CLINICAL AND APPLIED PSYCHOLOGY.

During a recent tour of observation carrying me into several States and cities where psychological studies of defectives are under way, I have been impressed by certain tendencies which are becoming increasingly evident, and which bode ill for the future of applied, and especially for clinical, psychology.

I. The opinion seems to prevail that *any person of intelligence is qualified to make mental diagnosis,* but that none but qualified physicians can make general physical or neurological diagnoses. This opinion has undoubtedly risen, in part, from the popularization and widespread use of the Binet-Simon tests, which, in appearance at least, are fairly easy of application. Now, I think it will be admitted by all who are competent to judge that mental are more difficult to diagnose than are physical abnormalities. It would be less absurd to expect intelligent business men, or physicists, or preachers to be able to examine sick persons or to diagnose diseases from reading a book on physical diagnosis than to expect grade teachers, social workers, lawyers, or even physicians not specially trained in psycho-clinical and psychiatric methodology, to be able to determine the mental status of psychically abnormal persons by reading a syllabus of mental tests and by giving a few of the stock tests. Even the Binet-Simon tests have a very limited value, so far as concerns the *mental diagnosis* of individual cases. They afford only an approximate idea of an individual's mental station—of his degree of arrest or acceleration. To be sure, this information is of the greatest practical value. But the fact is that these tests give us only the *first* word, not the *final* word, in the mental diagnosis of any case. Properly to diagnose a given case requires much more than merely putting an individual through a few stock tests (a fact that was clearly recognized by Binet); and it is safe to say that *no one is qualified to make a satisfactory examination or diagnosis who does not possess considerable experience in the actual working up of case histories of various kinds of mental defectives.* Mental examiners and diagnosticians are made, not born. Skill in psycho-clinical work comes from the mastery of clinical methodology, under the guidance of a master and through the first-hand study of cases.

II. If what I have just said be granted, it follows that, *in the selection of proper directors for the clinical and research work in*

the psycho-clinical laboratories, poor judgment is shown by the appointing powers in some institutions and schools. In some recent cases the appointees have been grade teachers who have spent a summer in some laboratory, or teachers who have spent a year or so in a school of education or in a psychological laboratory, or persons who have a good all-around education, but who are neither men of science nor mental clinicians. It is easy to see what appointees with such limited qualifications are and are not able to do. On the positive side, these workers are probably able to carry out certain tests quite satisfactorily, particularly if they have been in attendance at clinics. They have the ability to *make certain routine examinations.* They can, say, administer quite satisfactorily the Binet-Simon tests (particularly if they have been *trained* to do so), and locate a child in this scale. But they are very probably unfitted for the two highest functions of a psycho-clinicist. First, they are *incapable of giving a satisfactory psycho-clinical diagnosis of individual cases,* and second, they are *unable to conduct research;* that is, to prosecute productive and constructive work. If institutions and schools merely desire someone to carry out certain routine tests, or to classify individuals mentally by a graded scale (Binet-Simon), then persons of limited training, experience or education may answer the purpose. But no person other than a trained expert is able properly to diagnose and prescribe for individual cases or effectively to conduct original investigation. The constructive development of clinical psychology will be much retarded unless experts, definitely trained in clinical and scientific procedure, are placed in charge of the laboratories.

III. *The lack of a uniform, standardized procedure in the administration of the Binet-Simon scale* has become surprisingly apparent —but lack of space forbids a recital of the details. Not only so: *numerous changes and alterations in the scale (1908) are being made constantly;* practically every worker has some change to propose, and various workers have already issued, or are about to issue, altered or revised scales. These revisions are often based on the testing of a ridiculously limited number of boys and girls in each age, many of whom very probably are, in addition, untypical. Just now we need to do two things: first, we need *to subject the 1908 Binet-Simon scale to a protracted wide-range tryout on large masses of approximately normal boys and girls in each grade,* and second,

we need *to establish age-norms of various traits not tested in the scale,* to the end that the trait-norms thus established may eventually be fitted into the scale, so that the number of tests in each age may be somewhat increased.

In order to avoid the confusion which will inevitably arise from the use of various altered or revised Binet-Simon scales, and from the following of individual methods in the giving of the tests, I would make the following recommendations:

1. *The 1908 scale should be considered as the standard scale, at least in research work, and a standardized method of giving each test in the scale must be strictly followed.* No one is entitled to criticize the scale who has simply played with it (sampled a few of its tests); and no one is justified in asserting that he is using the Binet-Simon method who is following a procedure of his own in giving a limited number of tests.

2. *Examinees should be tested several mental ages below and above (particularly) the age in which they grade.* This is desirable for purposes of individual diagnosis (clinical aim), and is absolutely essential if we wish to give the tests for the purpose of testing out the accuracy of the scale (research aim).

3. *Anyone desiring to employ tests not contained in the 1908 scale should arrange these in a parallel scale, to be kept entirely distinct from the 1908 scale.* Such separate tests are already available in two (three with Terman's) 1911 revisions and alterations of the 1908 scale, and others are to be published shortly. It is extremely desirable that these and other tests should be tried out, standardized, 'normalized,' and, if they eventually prove satisfactory, be added to the proper mental ages in the 1908 scale. But it is just as desirable that all supplementary tests be kept separate until we are prepared to make a scientific reconstruction of the 1908 scale. There seems to be no other way of retaining the valuable tests in the old scale, some of which have already been discarded, and others of which may receive a like fate, or of more thoroughly testing out this scale than has yet been done, or of thoroughly testing out the new tests in the 1911 revisions, or any new tests which may be suggested in future, or of securing comparable data from different workers. Under this proposed arrangement it will be entirely possible for any investigator to state his results in terms of the *one uniform scale* (1908), as well as in terms of any revised scale which he desires to employ.

J. E. WALLACE WALLIN.

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ABSTRACTS AND REVIEWS.

CHARLES H. OLIN. *Phrenology.* Philadelphia: The Penn Publishing Company, 1910. Pp. 169.

Once in a while it is the part of discretion to shoot a dead crow. Such a crow is the "science" of reading "character from the shape of the head." Phrenology rests upon four fundamental principles: (1) The brain is the organ of the mind. This is true. (2) The mind may be reduced to a number of faculties. This is false, particularly if one considers the faculties found on a phrenological chart of localization. (3) These faculties are seated in definite regions. That is absolutely absurd. There is not the slightest resemblance between the phrenologist's localization of function that we find in physiological psychology. (4) "Knowing the mental faculties which are situated behind these different places, the phrenologist is able to judge of the development merely by the form of the head." This is preposterous nonsense.

But the phrenologist reads character successfully. This he does by observing facial expression, conduct, dress and general appearance, by skillful use of leading statements, and by indulging freely in bald generalities. In this work he is often a skilled artist, and any young man who pays a dollar for his chart certainly gets his money's worth in good advice. But the phrenologist is an imposter because, instead of saying to the candidate, "Let me look at your face and dress," etc., he says, "Let me measure scientifically the conformations of your cranium." The reason is that the latter pays, while the former would not. Mr. Olin's book is true to the type.

C. E. S.

SHEPHERD IVORY FRANZ. *New Phrenology.* Science, Vol. 35, March 1, 1912. Pp. 321-328.

In his presidential address before the Southern Society for Philosophy and Psychology, Washington, December 28, 1911, Dr. Franz

subjects to caustic criticism some current views of the cerebral localization of mental functions. The old phrenology of 100 years ago, based on the crude anatomy of Gall and Spurzheim, is pretty thoroughly discredited, but its fundamental conception of one function for one part of the brain has widespread ramifications in present-day theories of brain physiology. One does not have to go far in the literature to find reference to percept centers and concept centers, to the writing center and the reading center, to the auditory speech center and the motor speech center, and so on.

The most recent development of the new phrenology is the histological localization of mental processes. Elliott Smith, Campbell, Brodmann and others have distinguished from 18 to 50 histologically distinct areas, and have assumed for them correspondingly distinct mental functions. It is true that we are not always given a complete description of the mental process which goes on in each area, but this is only a matter for the future. Campbell, for example, does not hesitate to assign the sensations of touch, temperature, pain and movement to the area immediately behind the fissure of Rolando, while the region just back of that contains the corresponding percepts, touch localization, and the so-called stereognostic sense. In like manner Campbell distinguishes visuo-sensory and visuo-psychic areas, areas for muscular memory, etc. Bolton and Kappers go even so far in their phrenological speculations as to assign different types of mental activity to different layers of the cortex. In all of this the author thinks the new phrenologists have outstripped the old. Cells and cell groups may be localized, and there is partial agreement on the symptoms that accompany certain definite lesions, but there is no more ground for assigning specific mental functions to particular brain areas than for assuming a bump of combativeness or a bump of acquisitiveness. J. C. B.

NOTES AND NEWS.

A PAIDOLOGICAL LABORATORY.

An inspection of the Twenty-third Annual Report of the New Jersey Training School for Feeble-Minded Girls and Boys increases our appreciation of the broad philanthropic spirit which characterizes the direction of that institution. The first and most insistent demand upon such a school is undoubtedly the local one of ministration to the needs of its pupils, and that this demand is admirably met at Vineland is evident to the casual visitor. The latest advances of knowledge in the medical, psychological, pedagogical and social sciences are eagerly utilized by an alert and capable staff, under the guidance of a sympathetic and inspiring superintendent. But the Vineland school differs from many of our institutions in that its work does not stop here. Its mission is conceived in a broader spirit than the mere satisfaction of local needs. The tremendous opportunities that are offered for research into the nature and causes of feeble-mindedness are clearly recognized, and, as far as limited resources will allow, these opportunities are used to advance the bounds of our knowledge. It is a veritable laboratory for the study of arrested development in the child. Largely through its influence the State of New Jersey has appropriated considerable sums for research, and has adopted a comprehensive plan for the welfare of its defectives—the first state in the Union to attack this problem scientifically. The plan includes the training of teachers and physicians, medical and psychological inspection of school children, inspection and study of delinquents, employment of school nurses, establishment of special classes in the public schools, and suitable custodial provision for all who need institutional care. Furthermore, the Vineland institution is performing a national service in arousing popular interest in the problem of defectives, and in disseminating knowledge of the most approved methods of dealing with them. In carrying out its far-reaching plans, however, the management is greatly hampered by lack of funds. The school is not a state institution, and cannot receive any appropriation from the state for buildings or improvements. To effectively prosecute the great work that lies at hand the institution should have an endow-

ment of at least a million dollars. It would be difficult to find a more promising "business investment" than is here offered to philanthropically disposed persons. Nowhere could the expenditure of money realize greater returns in the welfare of humanity. J. C. B.

THE ST. LOUIS MEETINGS.

On February 26-29 the Department of Superintendence of the N. E. A. held its annual meeting in St. Louis. At the same time were held special sessions of the National Council and of the Department of Normal Schools, and the annual sessions of the National Society for the Study of Education, the Society of College Teachers of Education, and several other organizations. These mid-winter meetings are considered by many the most important educational meetings of the year, and judged by the number in attendance and the interest manifested in the topics proposed for discussion, the St. Louis gathering was one of the most successful that has ever been held. One's estimate of such a meeting necessarily rests upon general impressions, but in the opinion of the writer three characteristics were fairly prominent: First, there was a refreshing absence of the undertone of political intrigue which has been all too conspicuous in some of the N. E. A. meetings. The objects and interests of the meeting were educational, and educational topics were the ones discussed in the lobbies and corridors of the hotels. Second, a large proportion of the attendance consisted of educational specialists, either from colleges and universities, or from the administrative and instructional forces of the public schools. This took away some of the atmosphere of dilettantism which too frequently characterizes educational meetings and tends to make them vague and fatuous. There was a surer touch, a firmer grasp of the problems presented. Finally, perhaps owing to the specialists, there was more definiteness in the formal papers and more genuine discussion of the points raised than is usually observed in such meetings. It has become almost a truism that an educational meeting is the place above all others to hear breath wasted. Trivialities and time-worn platitudes are dished up with oratorical garnish and served hot to an uncritically devouring multitude. Far be it from me to intimate that there was none of this at St. Louis. Fashions do not change so quickly. But on the whole the speakers gave evidence of really having something to say, and at times the discussions showed a healthy disagreement with the views advanced. J. C. B.

EFFICIENCY THE KEYNOTE.

The dominant topic in all the meetings was efficiency in education. But what is efficiency? How can we determine what sort of educational procedure is efficient? We must first establish standards or norms of efficiency; we must have units of measurement to apply to educational results. The plans of the committee appointed to devise such tests were outlined by Professors Strayer and Elliott and Superintendent Van Sickle. It is natural that in a gathering of this sort efficiency should be considered primarily from the administrative point of view. Already in the administration of school systems we have a great deal of material in the way of records and reports which might be utilized in working out standards of efficiency if the data were given in such form as to be usable. Unfortunately, there is little uniformity in such reports, and much of the material is worthless, because it cannot be correctly interpreted. Remedies for this condition were proposed, and received a careful hearing.

Economy of time was a topic which loomed large in the discussion of efficiency, and sessions were devoted to its consideration, both by the Council and by the Department of Superintendence. There is no doubt that much time is wasted by pupils in elementary schools, and it is gratifying to find school superintendents grappling with the problem. It is an open question, however, whether the statistical studies of retardation have not resulted in undue emphasis on promotion, to the neglect of the kind of teaching that children should have. Emphasis on promotion puts a premium on holding the age-grade level constant, and altogether neglects the individual difference of children. Some children need to be held back; others need to go ahead rapidly. As one speaker put it, we should beware that our promotion machinery does not swamp the child.

The value of investigations by outside experts to determine the efficiency of school systems received a great deal of attention. It is indeed hard for us to see ourselves as others see us, but if the vision of others is dimmed by the dust and heat of controversy, or if they have forced upon them the blinders of preconceived judgment and are told what they are expected to find, their observations may be even worse than useless. Fortunately, contemporary investigating committees stoutly refuse to have their eyes hampered in any way. The trouble is that the political influences claiming to represent the people serenely pursue their own ends, quite regardless of the reports of investigating committees.

Another important aspect of the efficiency problem which was the object of much discussion was the diversification of the course of study to meet the needs of individual pupils. This and the scientific study of the art of teaching individual subjects seem to the writer to lie at the very root of efficiency. It may be, as some vociferously claim, that we are trying to teach individual pupils too many things at once, but certainly our curricula, both in the elementary and the high school, are bound to become richer rather than poorer. The school must provide for each child such an education as his abilities and opportunities require. Hence the increasing demand, voiced in St. Louis, for special schools, special courses, vocational training in the upper elementary grades, and far greater diversification of all sorts in the high school. One proposal for meeting the administrative difficulties of this diversification was the establishment of a junior high school.

Aside from a brief account of the use of tests in arithmetic, the development of the science of teaching had no place on the program. This is, after all, the central problem of efficiency, and its neglect clearly shows how far practical school men are from a realization of the aim which the public sets for them—the efficient education of all the children. Yet it is gratifying to note that there is a quickened sense of responsibility in the matter, and that the way is being cleared of administrative obstructions, so that in time the fundamental problem of teaching may be reached. J. C. B.

ACTION ON THE PHONETIC KEY RESCINDED.

At the business meeting of the Department of Superintendence, after spirited presentation of the advantages of different cities, it was decided to hold the next meeting in Philadelphia. A resolution to adopt the simplified spellings of certain words was laid on the table. It was evident that the investigations upon the proposed phonetic key alphabet, which have been referred to in these columns, had brought about a decided change of attitude on the part of the members, for a resolution further endorsing that key was promptly tabled, and a subsequent motion to rescind the action taken on the key at the Mobile meeting was carried by a large majority. There is little doubt that the ill-advised attacks made by the advocates of the key upon Professor Whipple's investigation contributed materially to this result. Many of the members must have felt as did Dr. Goddard, who expresses himself

in another section of this issue. We hail this action, therefore, as a vote of confidence in the application of experimental methods to educational problems, and as opposed to the acceptance of the mere opinions of those who claim to be authorities. J. C. B.

The topics for discussion at the meeting of the Harvard Teachers' Association, held on March 9, were "The Measurement of Educational Products," Prof. E. L. Thorndike, Teachers College, Columbia University; "Measuring Educational Processes Through Educational Results," Dr. Leonard P. Ayres, Russell Sage Foundation, and "Tests of College Efficiency," Clyde Furst, Carnegie Foundation, and Prof. Edwin F. Gay, dean of the graduate school of business administration, Harvard University.

At the Southern Commercial Congress, to be held at Nashville, Tenn., April 8-10, 1912, an evening will be devoted to a detailed consideration of the South's educational recovery. Representative speakers have been invited from each of the Southern States, "and each one will come prepared with statistical proof of the contrast between conditions of 1860, 1870 and 1910, and in a ten-minute address will define the ideal and hope and aspiration of the State for which he speaks."

The Italian Psychological Society held its first meeting in the Institute of Experimental Psychology, at the University of Turin, October 15-17, 1911. Most of the papers dealt with the results of experimental investigations of sense psychology. Two had some bearing on educational psychology: "The Methods of Modern Psychology," Prof. Sante De Sanctis, and "Quantitative Experimental Researches on Types of Mental Work," Prof. Maccagno. The next meeting will he held in Rome, October, 1912.

Among the resolutions adopted by the Kansas State Teachers' Association at the forty-ninth annual session, November, 1911, we note the following: "Statistics recently prepared by high authorities concerning the prevalence of venereal disease are so astounding as to be almost beyond belief. Almost without exception these investigators, as well as social workers and sanitarians, believe that the social evil can never be satisfactorily met until sex hygiene is properly taught in the public schools. Much sickness and most mental disturbances can be prevented if certain normal physiological processes are understood and a purer moral atmosphere created by frank authoritative discussions of the things every high school child should know. We recommend that this urgent but delicate

duty be accepted as one of the responsibilities of the teacher and school administrator, and that the various local attempts at solution be made public through our educational system."

The teaching of sex hygiene will not be introduced into the schools without opposition on the part of conservatives. Dr. Hermon Cassini, a member of the School Board of Orange, N. J., made a vigorous protest at a recent meeting of the Board against the continuance of sex hygiene as a part of the curriculum in the schools of that city. Dr. Cassini averred that twenty-eight pupils of one school had been ordered by their parents to cease attending school on account of the teaching in sex hygiene, and that several physicians agreed with him that the subject was not a proper one to be taught in public schools. The statement of Dr. Cassini brought out much opposition. Commissioner Abrams contended that the subject was one of the best ever taught in the schools, and he was supported by enough of his colleagues to make the vote on the question of continuing it result in a tie. It was finally decided to refer the matter to the teachers' committee for a quiet investigation.

The year 1912 has seen the establishment of four new journals which are of interest to educational psychologists. We are glad to welcome *The English Journal*, James Fleming Hosic, managing editor, Chicago Teachers College, published monthly, September to June, by the University of Chicago Press, subscription price $2.50. The journal contains original articles, reports, communications, news notes and editorials, and presents a very clean-cut, businesslike appearance. We trust that when it gets fairly established it will endeavor to arouse interest in experimental work on the teaching of English. *The Kansas School Magazine*, Edgar F. Riley, editor-in-chief; J. H. Glotfelter, business manager, published monthly, except July and August, at Emporia, Kans., subscription price $1.25, is decidedly superior to the ordinary state school journal. The original articles set a high standard of excellence, and the editorials are permeated with the inquiring spirit of the times. The typographical work might in some cases be improved. In France the League of National Education has undertaken the publication of a *Revue mensuelle d'education nationale*, issued at 3 Rue Dante, Paris. The League is throwing itself into a work of national regeneration. The Italian psychologists, Sante De Sanctis, G. Villa, E. Morselli and R. Assagioli, announce the publication of *"Psiche": Rivista di studi psicologici*, with editorial offices at 46 Via degli Alfani, Florence.

They aim to offer a thoroughly modern psychological journal, which will reflect the present status of the subject in its relations to philosophy, science and life. Each number of the review will be devoted to a single topic.

The School of Education of the University of Kansas has recently issued a Professional Directory of Administrators and Teachers in Accredited High Schools of Kansas.

Prof. Maria Montessori has opened a school at 12 Via Giusti, Rome, for the training of teachers in the use of her primary methods as developed in connection with the "Houses of Childhood."

The *Société libre pour l'etude psychologique de l'enfant,* of which Prof. Alfred Binet was the president and guiding spirit for ten years until his death last autumn, has recalled as its active president M. Buisson.

Dr. J. Carleton Bell of the Brooklyn Training School for Teachers will give two courses in the Summer School of New York University, one on "Educational Psychology," with especial reference to the control of human behavior, and the other on "The Psychology of the Elementary School." The latter course will include a detailed analysis of the educational activities of the child from the kindergarten to the high school.

Dr. Bird T. Baldwin, professor of education and director of the School of the Art of Teaching, University of Texas, has been called to head the new department of psychology and education at Swarthmore College.

Dr. Samuel P. Hayes, professor of psychology in Mt. Holyoke College, has been granted a leave of absence for the second semester. He will spend the time abroad, chiefly at Cambridge University.—*Journal of philosophy, Psychology and Scientific Methods.*

Elizabeth Kemper Adams, associate professor of philosophy and education at Smith College, has been advanced to professor of education in that institution.

Dr. Arthur Holmes, assistant professor of psychology at the University of Pennsylvania, has been appointed dean of the faculties in Pennsylvania State College.

Prof. Herman Henderson of the Wisconsin State Normal School at Milwaukee will offer courses in the psychology of education at the Oberlin College Summer School.

PUBLICATIONS RECEIVED.

(Notice in this section does not preclude a more extended review.)

JAMES ROWLAND ANGELL. *Chapters from Modern Psychology.* New York: Longmans, Green & Co., 1912. Pp. vii, 308. $1.35 net.

This volume contains the first series of lectures delivered upon the Ichabod Spencer Foundation at Union College during the early part of 1911. In eight lectures an "attempt has been made to convey a just and comprehensive impression of the principal features of the psychology of today, freed as far as possible from the technicalities of scientific terminology."

LEONARD P. AYRES. *A Scale for Measuring the Quality of Handwriting of School Children.* New York: Russell Sage Foundation, 1912. Pp. 16.

Handwriting exists primarily to be read. That handwriting is the best that can be most easily read. Ease of reading may be shown by the time required. Upon these assumptions Dr. Ayres set out to construct a scale for the quality of handwriting. First, 1578 samples were collected from school children of 38 States. Each of these samples was then read by 10 investigators, and each reading was accurately timed. Each sample was rated in words per minute, and from these a scale was constructed with samples of three styles of writing at each 10-point interval from 20 to 90. Due credit is given to Professor Thorndike's pioneer work in the construction of a scale for handwriting, but it is pointed out that the present scale is constructed solely on the basis of legibility. It would be interesting to have each scale evaluated in terms of the other. It will be observed that neither scale takes any account of speed of execution—an important factor in the teaching of writing.

LEONARD P. AYRES. *The Relation Between Entering Age and Subsequent Progress Among School Children.* Reprinted from Education, February, 1912. Pp. 9.

A study was made of the school history of 25,000 children in respect to their entering age and their subsequent progress in school. It was found that children entering at advanced ages made slightly more rapid progress than those who enter younger, but that the entering age of six furnishes the most homogeneous group, judged on the basis of subsequent progress.

EDITH N. BUCKINGHAM. *Division of Labor Among Ants.* Reprinted from Proceedings of the American Academy of Arts and Sciences, Vol. 46: 1911, No. 18. Pp. 425-507.

A study of the behavior of these classic insects which should not be

overlooked in any discussion of instinct. A more detailed notice will follow.

MAXIMILIAN P. E. GROSZMANN. *Legal Provisions for Exceptional Children.* Reprinted from Proceedings of N. E. A., July, 1911. Pp. 1070-1077.

An examination of the compulsory education laws of the various States reveals the fact that practically no provision is made for mentally defective children other than to excuse them from school attendance. In view of the close connection which has been shown to exist between mental retardation and criminal incorrigibility, it would seem that society is neglecting one of the most obvious measures of self-preservation.

MAXIMILIAN P. E. GROSZMANN. *The Backward Child vs. the Feeble-Minded Child.* Reprinted from American Journal of Obstetrics, Vol. 65: 1812.

"There is a vast difference between the relatively few cases of abnormal conditions and the far greater number of children who are handicapped in many other ways. There is a difference between *arrested* development which can go no farther, and *retarded* development which may produce power and genius; between backwardness and feeble-mindedness; between the bad boy and the criminal. Let us give the feeble-minded and abnormal class the attention it needs. But let us emphasize the fact that education is largely concerned in the saving of those who can be saved, in the uplifting of those who can be uplifted."

HERMAN HARRELL HORNE. *Free-Will and Human Responsibility.* New York: The Macmillan Company, 1912. Pp. xvi, 197. $1.50 net.

A simple, straightforward discussion of the perennially interesting question, "Does the fate of man rest at all with himself or not?" The arguments for determinism, drawn from science, philosophy and theology, are presented in as convincing a manner as possible, and then refuted from the same sources. The pragmatic attitude toward free-will is neatly summed up.

ALEXANDER JAMES INGLIS. *The Rise of the High School in Massachusetts.* New York: Teachers College, Columbia University, 1911. Pp. 166. $1.50.

A valuable piece of historical research, tracing the development of the high school in Massachusetts to 1860, and involving the examination of practically every report of every town from 1838 to 1863.

J. A. MACVANNEL. *Outline of a Course in the Philosophy of Education.* New York: The Macmillan Company, 1912. Pp. x, 207.

There is a distinct need for an adequate treatment of education

from the philosophical point of view. As the author says, "the rough notes and suggestions furnished in this outline are but words along the way." Nevertheless, Professor MacVannel has made a most commendable beginning. A philosophy of education, he believes, should aim at the solution of three problems: (a) to trace the significance of education in its main outlines as a conscious, historical effort toward human evolution; (b) to determine the meaning and purpose of the educational process in its functional relation to the wider intellectual and social process of the present and to the general process of life and reality, and (c) to formulate an educational ethics. The philosophical treatment of education properly emphasizes the need of examining critically the postulates and hypotheses which are assumed in educational practice and in the narrower fields of theory.

SALVADOR MASSIP. *La reforma de la escuela.* Habana: La Propagandista, 1912. Pp. 22.

A plea for the reform of Cuban schools along the lines of vocational education inaugurated by Kerschensteiner in Germany and advocated by Snedden in this country.

Mathematics in the Elementary Schools of the United States. Bulletin 460. Washington: Bureau of Education, 1911. Pp. 185.

A valuable presentation of what is actually attempted and accomplished in mathematics in the elementary schools of this country. It is the report of the American Committees I and II of the International Commission on the Teaching of Mathematics.

Mathematics in the Public and Private Secondary Schools of the United States. Bulletin 463. Washington: Bureau of Education, 1911. Pp. 187.

A companion to the report just mentioned. The two together give an admirable survey and criticism of the work in mathematics in the public schools.

ERNEST CARROLL MOORE. *Present Tendencies in Secondary Education.* Burlington, Vt.: University of Vermont, 1911. Pp. 20.

A vigorous arraignment of the narrowness of the present traditional high-school course, and a plea for at least nine different types of courses in every first-class high school. "I am one of those who is convinced that the modern high school, to be a training school for life, must be throughout a vocational school."

ERNEST CARROLL MOORE. *Report of the Examination of the School System of East Orange, N. J.* Issued by the Board of Education, 1912. Pp. 64.

This report is full of practical suggestions on all matters of school

work from the teaching of reading to the functions of the Board of Education.

FRED MUTCHLER AND W. J. CRAIG. *A Course of Study for the Preparation of Rural School Teachers.* Bulletin 469. Washington: Bureau of Education, 1912. Pp. 23.

Papers Presented for Discussion at the Meeting of the Society of College Teachers of Education, St. Louis, Mo., 1912. *Graduate and Undergraduate Courses and Degrees in Education. Normal Schools and University Departments of Education. The Present Status of Education as a Science.* The School Review Monographs, No. II. Chicago: The University of Chicago Press, 1912. Pp. 153. 56 cents, postpaid. To be reviewed.

JOHN W. RITCHIE. *Primer of Sanitation.* Yonkers-on-Hudson, N. Y.: World Book Co., 1911. Pp. 200. 60 cents, postpaid.

JOHN W. RITCHIE AND JOSEPH S. CALDWELL. *Primer of Hygiene.* Yonkers-on-Hudson, N. Y.: World Book Co., 1910. Pp. 184. 48 cents, postpaid.

Two books, prepared by professors of biology, scrutinized and criticised before publication by a large number of experts, and aimed to supply the pupils of the elementary schools with all that is needed for the comprehension of personal hygiene and sanitation. The treatment is scientific, straightforward, well proportioned. The illustrations are clever and well designed to impress youthful readers. We commend these books to teachers in the grade schools.

W. H. SMITH. *All the Children of All the People.* New York: The Macmillan Company, 1912. Pp. x, 346.

The author of the "Evolution of Dodd" here presents in a popular form some of the puzzling problems that have arisen in the experiment of universal education. There is much sound sense in the book and abundant vital (but good-tempered) criticism of the present organization of American education. Instances of shortsighted criticism are, of course, to be expected. From reading Chapter XXII, for example, one is led to infer that the higher institutions have solved the problem of educational values by adopting the elective system, and the author believes that many of the defects of the lower schools could be corrected by adopting the same system "from top to bottom." We are told that "any study is of educational value that the student genuinely loves," and that any study which is pursued from any other motive is "a bore and a cheat." Criticism of this sort, it is clear, virtually charges the schools with an impossible task. When social life is so organized that everyone may do the work that pleases him and decline to do anything in which he fails to find an interest, the principle of free election may well be adopted in deter-

mining educational values. The briefest study of the elective system in American colleges will show that it is far from ideal, and whatever virtues may be apparent in its operation in German universities they are strictly conditioned by the thorough preparatory training of the German student—a training in which not a vestige of the elective system is to be found.

Statistics of State Universities and Other Institutions of Higher Education Partially Supported by the State. Bulletin 468, Washington: Bureau of Education, 1912. Pp. 23.

W. J. SUTHERLAND. *Some Sources of Waste in Education.* Published as a Quarterly Bulletin of the Platteville (Wisconsin) State Normal School, 1911. Pp. 16.

Three chief sources of waste are emphasized: (a) unjustifiable aims of education, of which the disciplinary aim is the most significant illustration; (b) overburdened curricula, with the attendant difficulty of concentration upon any one topic; (c) inefficient practices in teaching, especially in the assignment of work and in the drawing of generalizations.

ERNEST L. TALBERT. *Opportunities in School and Industry for Children of the Stockyards District.* Chicago: The University of Chicago Press, 1912. Pp. 64.

The large problem of vocational direction in the public schools is considered in a practical way. The district studied is peopled by immigrants of various races, and their children seldom remain in school after the fourteenth year. The statements of principal, teacher, child and parent unite in the conclusion that the public school is not meeting the needs of adolescence and adjusting the child to his future work. A solution of the problem would be to have a well-qualified person in each public school as a vocational adviser—a person who would study the advancement, tastes, and changing interests of growing boys and girls, and keep a record of their progress. Facts pertaining to wages, treatment and qualifications of workers in specific vocational lines should be given the children to study. Visits to factories, stores and workshops should be supplemented by talks to the older pupils by business men, professional men and representatives of labor unions.

CLARA HARRISON TOWN. *The Binet-Simon Scale and the Psychologist.* Reprinted from the Psychological Clinic, Vol. V, No. 8, January 15, 1912. Pp. 239-244.

The author cautions against the danger of indiscriminate use of the scale by amateurs, and shows by extensive quotations that Binet himself foresaw and endeavored to guard against such a danger. Some of Dr. Ayres' criticisms were forestalled by Binet, and others were not well founded.